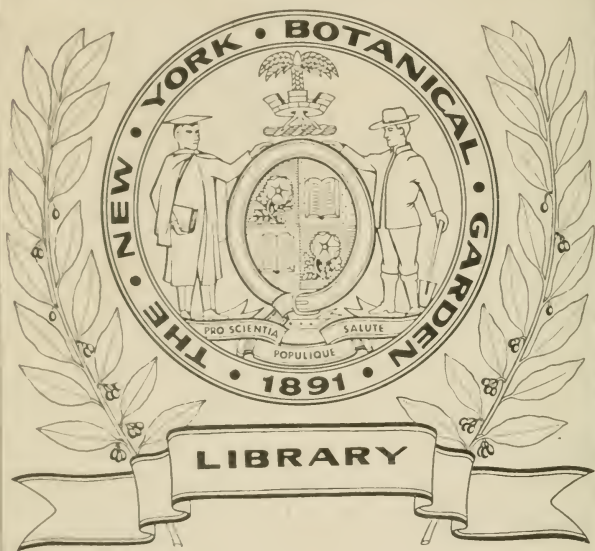
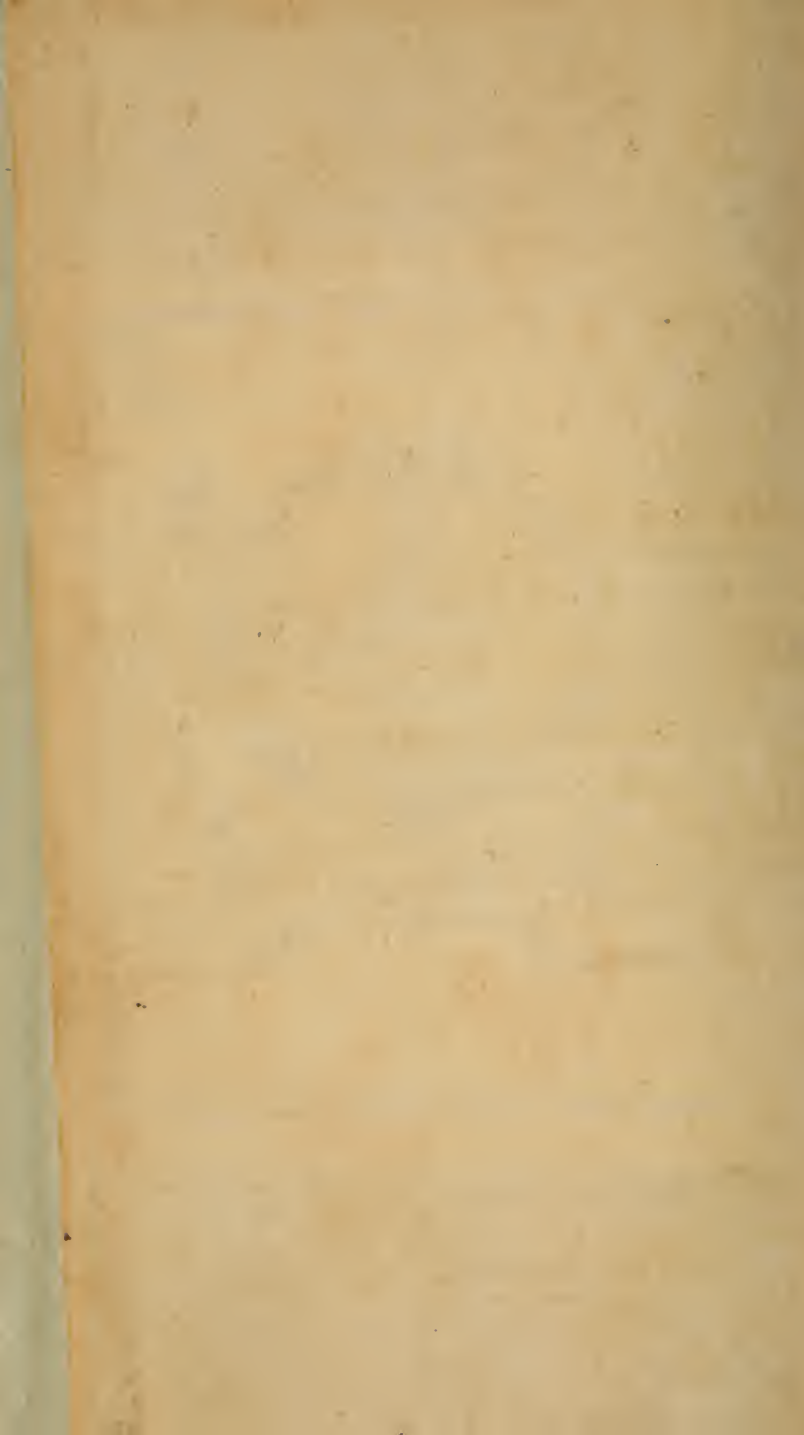


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MISCELLANEOUS TRACTS
RELATING TO
NATURAL HISTORY,
HUSBANDRY,
AND
PHYSICK.

To which is added the

CALENDAR of FLORA.

By BENJ. STILLINGFLEET.

THE SECOND EDITION,

Corrected and augmented with additional Notes
throughout, particularly on some of the English
Grasses, which are illustrated by Copper Plates.



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GARDEN.

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And sold by R. and J. DODSLEY, in Pall-Mall ;
S. BAKER, in York-Street, Covent-Garden ;
And T. PAYNE, at the Muse Gate.

MDCCLXII.

Homo naturæ minister et interpres tantum facit et intelligit,
quantum de naturæ ordine, re vel mente observaverit : nec
amplius scit vel potest. BACON.

Primus gradus sapientiæ est res ipsas nosse ; quæ notitia consistit
in vera idea objectorum ; objectâ distinguuntur et noscuntur
ex methodica illorum *divisione* et conveniente *denominatione* ;
adeoque divisio et denominatio fundamentum nostræ scientiæ
erit. LINN.



TO THE

RIGHT HONORABLE

George, Lord Lyttelton,

Baron of FRANKLEY.

MY LORD,

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GARDEN.

BESIDES private motives of respect and honor, there is another of a public nature, which makes me desirous to inscribe the following sheets to Your Lordship. I mean the zeal which You shewed in Parliament for securing to this Country that noble collection of natural curiosities now repositied in the British Museum; which cannot fail

DEDICATION.

in time to produce many good effects, and prove the truth of what Your Lordship observed, that the reputation and interest of the nation were highly concerned in that purchase. I am, with the greatest regard,

MY LORD,

Your Lordship's most Obligated
and Humble Servant,

BENJ. STILLINGFLEET.



P R E F A C E
O F T H E
T R A N S L A T O R.

THE following pieces were selected from many others published by several ingenious members of that great, and hitherto unrivalled school of natural history, the university of Upsal in Sweden, under the presidency of Linnæus^a. They

A 3 were

^a Linnæus Phil. Bot. p. 9. has these words, vid. dissert. nostra de ficu. Now there is a piece in Amæn. Acad. vol. 1. on this subject, in which the matter referred to is contained. This piece goes under the name of Cornelius Hegardt, tho' Linnæus plainly quotes it

were selected not as the only, or even the most valuable, but as answering best the intention of the translator; which was to make known more generally how far all mankind is concerned in the study of natural history, and thereby to incite such as are properly qualified to prosecute, and encourage that branch of knowledge, and spread, as far as the nature of the thing is capable of, amongst all orders of men in this nation, the improvements made in it by the excellent Linnæus. His name, it must be confessed, has been for some time past in the mouths of people, but his works, i imagine, are little known except to a few virtuosi who have a more than ordinary curiosity, and ardor to look into the minute parts of nature. It cannot indeed be otherwise. For to understand him and to make use of his method, requires

it as his own. How far that may be the case of all the other pieces in the Amæn. Acad. i cannot pretend to say. But it is most likely from the practice in foreign universities in relation to theses held for degrees, that they must in great part be attributed to him, as president.

more

more patience and time than are likely to fall to the share of the generality of the world. My design therefore is not to exhort people indiscriminately to study his works; but, as i observed before, to give them some idea how usefull his pursuits are likely to become in many respects. There will appear, i imagine, such great and extensive views in relation to husbandry, physic, and the general œconomy of human life in the few specimens i have given, that in this age and nation, where every art and science, that can be of any use to the public, are sure to meet with generous encouragers, there will be found many who will readily promote any rational endeavour to push these discoveries farther, or put in practice such hints, as may seem to bear a probable appearance of success.

I can scarcely condemn mankind for treating with contempt a virtuoso whom they see employed in poring over a moss or an insect day after day, and spending his life in such seemingly unimportant and barren speculations. The first and most natu-

ral reflections that will arise on this occasion must be to the disadvantage of such pursuits. Yet were the whole scene of nature laid open to our views, were we admitted to behold the connections and dependencies of every thing on every other, and to trace the œconomy of nature thro' the smaller as well as greater parts of this globe, we might perhaps be obliged to own we were mistaken; that the Supreme Architect had contrived his works in such a manner, that we cannot properly be said to be unconcerned in any one of them; and therefore that studies which seem upon a slight view to be quite useless, may in the end appear to be of no small importance to mankind. Nay, were we only to look back into the history of arts and sciences, we must be convinced, that we are apt to judge over hastily of things of this nature. We should there find many proofs, that he who gave this instinctive curiosity to some of his creatures, gave it for good and great purposes, and that he rewards with usefull discoveries all these minute researches.

It is true this does not always happen to the searcher, or his contemporaries, nor even, sometimes to the immediate succeeding generation ; but i am apt to think that advantages of one kind or other always accrue to mankind from such pursuits. Some men are born to observe and record what perhaps by itself is perfectly uselefs, but yet of great importance, to another who follows and goes a step farther still as uselefs. To him another succeeds, and thus by degrees ; till at last one of a superior genius comes, who laying all that has been done before his time together brings on a new face of things, improves, adorns, exalts human society.

All those speculations concerning lines and numbers so ardently pursued, and so exquisitely conducted by the Grecians ; what did they aim at ? or what did they produce for ages ? A little arithmetic, and the first elements of geometry were all they had need of. This Plato asserts, and tho' as being himself an able mathematician and remarkably fond of these sciences, he

re-

recommends the study of them, yet he makes use of motives that have no relation to the common purposes of life.

When Kepler, from a blind and strong impulse merely to find analogies in nature, discovered that famous one between the distances of the several planets from the sun, and the periods in which they complete their revolutions ; of what importance was it to him or to the world ?

Again ; when Galileo, pushed on by the same irresistible curiosity, found out the law by which bodies fall to the earth, did he or could he foresee that any good would come from his ingenious theorems, or was any immediate use made of them ?

Yet had not the Greeks pushed their abstract speculations so far ; had not Kepler and Galileo made the above mentioned discoveries ; we never could have seen the greatest work that ever came from the hands of man. Every one will guess that i mean Sir Isaac Newton's Principia.

Some obscure person, whose name is not so much as known, diverting himself idly

as a stander-by would have thought, with trying experiments on a seemingly contemptible piece of stone, found out a guide for mariners on the ocean, and such a guide as no science, however subtile and sublime its speculations may be, however wonderful its conclusions, would ever have arrived at. It was bare curiosity that put Sir Thomas Millington upon examining the minute parts of flowers; but his discoveries have produced the most perfect, and most usefull system of botany that the world has yet seen.

Other instances might be produced to prove, that bare curiosity in one age is the source of the greatest utility in another. And what has frequently been said of chymists, may be applyed to every other kind of vertuosi. They hunt perhaps after chimæras and impossibilities, they find something really valuable by the bye. We are but instruments under the Supreme Director, and do not so much as know in many cases what is of most importance for us to search after. But we may be sure
of

of one thing, viz. that if we study and follow nature, whatever paths we are led into, we shall at last arrive at something valuable to ourselves and others, but of what kind we must be content to remain ignorant.

I am sensible that after all i have said, or can say, many people will not be persuaded to allow that the study of some parts of natural history can be worthy of a rational creature. They will never vouchsafe to look on mosses and insects in this light. Yet why may not the study of these likewise have its use in future times? It ought to be considered that the number of the latter is immense, that it is but lately that any great attention has been paid to them, that one of them is and has been long the means of cloathing thousands and feeding more, that another affords us honey, another a fine dye, not to mention some few besides, of acknowledged benefit to mankind. Lastly, that they are capable of doing us the greatest mischief, and that it is possible that a more thorough knowledge
of

of them may instruct us how to secure ourselves against their attacks. Whether this be possible we can never know, till proper encouragement has been given to this branch of natural history. Something to the same purpose might be said concerning mosses, but as the intent of one of the following pieces is principally to take off such objections as i have been considering, i shall dwell no longer on this subject; but proceed to give a short account of what Linnæus has done towards the improvement of natural history, that the reader, who is unacquainted with his works, may form some idea, tho' very imperfect, of this great man. First then, he has invented a new system of botany, founded on the male and female organs of generation in plants, a system which has thrown a new light over botany. He has defined about 10,000 plants, ranged them into classes, genera and species, given new and regular generical names to many instead of those barbarous and uncouth ones which prevailed till his time, and added specifical
names

names to all, short, easy, and oftentimes significant, a thing never so much as attempted before. He has brought into botany, a precision, conciseness and elegance, that were very much wanted. He has observed and given names to some parts of plants not taken notice of by any other botanist, parts which in some cases are sufficient as well as necessary to distinguish the genus and the species.

The *Philosophia botanica*^b of this author affords throughout instances of this reformation. Had he wrote no other book but this, he would have deserved the highest praise from all lovers of botany. For besides the improvements just mentioned it comprehends in a short compass some-

^b In the year 1750. when he was writing this book, as he tells us in the preface to it, he was hindered from going on by a terrible fit of the gout, that broke the strength of his mind as well as body. In the year 1755, he says, *Flor. Suec.* article 450. that he had been freed from the gout for some years by eating great quantities of fresh strawberries. He adds that this fruit dissolves the tartar of the teeth, that it is remarkably good for people afflicted with the stone or gout, and that it may be safely eaten in abundance.

thing

thing of consequence in every branch of that part of natural history, and affords hints for various discoveries, hints that must, if pursued, produce many considerable improvements in physic, husbandry, and œconomy.

He has published a *Materia medica* so far as relates to plants, in which he has undertaken to determine many species commonly used but not sufficiently ascertained, adding throughout in the shortest manner possible what he has found to be useless or efficacious, and as he assures us never highly recommends any without being thoroughly convinced of their virtues by his own experience in the hospitals where he presided. Some of these medicines have not yet, i believe, been received into our shops, but they may possibly deserve consideration.

In the last edition of his *Systema naturæ* he has mentioned above 1500 species of insects, has classed them all, divided them into genera and species, described them as to the minutest parts so far as was necessary to distinguish them, marked the places
4 where

where they are to be found, the plants they feed upon, their transformations, cited the authors who have treated on them, given them classical, generical, and trivial or specific names; has done the same by birds, fishes, and all other known animals; has ranged all the fossils, minerals and stones, to use his language, in a manner partly borrowed, and partly founded on his own observations. But what improvements and additions he has lately made to this part of natural history, as well as that of plants, we cannot say till the other part of his new edition of the System of nature comes out, which is expected daily. However what we see he has done in relation to animals, leaves us no room to doubt but that it will all together be the most extraordinary book that was ever published in this or almost any other way.

Besides his writings, of which i have mentioned but a small part, this indefatigable man, born to be nature's historian, has travelled over Lapland, all Sweden, part of Norway, Denmark, Germany,
I Holland,

Holland, England, and France, in search of knowledge. That part of his travels which is published in Latin has many curious and useful observations relating to the purposes of common life. Of those which are written in his own tongue I cannot give any other account, but that by some quotations from them to be found in the writings of his disciples it appears, that they very well deserve to be communicated to the world in a language more generally understood.

Besides these labours of his own, the world will be one day obliged to him for what others have done. Incited by his example and persuasion, C. Ternstrom went into Asia; P. Kalmius to Pensilvania and Canada; L. Montin into one part of Lapland; D. Selander into another; F. Hasselquist into Ægypt and Palestine; O. Toren to Malabar and Surat; P. Osbeck to China and Java; P. Loeffling to Spain and America; P. J. Berg to Gothland; M. Koehler to Italy and Apulia; and D. Rolander to Surinam and St. Eustacia; all

these with a view to the promotion of natural history. When we consider him in this light of a master of such disciples as these, and many others, some of whose works make up the following book, he must appear like Homer at the head of the poets, Socrates at the head of Greek moralists, and our Newton at the head of the mathematical philosophers. Among all these extraordinary qualifications there appear throughout his writings spirit, candor, a due regard for others, and proper modesty and diffidence of himself.

I will give a short specimen of his way of thinking in relation to the degree of human knowledge hitherto attained by man on the subject of natural history. A subject on which it was very natural for a less extensive genius to be vain, as he has had so great a share himself in the advancement of it. The passage is taken out of the introduction to the new edition of his *System of nature*, and is to this effect. ‘How
‘ small a part of the great works of nature
‘ is laid open to our eyes, and how many
‘ things

‘ things are going on in secret which we
 ‘ know nothing of ! How many things are
 ‘ there which this age first was acquainted
 ‘ with ! How many things that we are ig-
 ‘ norant of will come to light when all
 ‘ memory of us shall be no more ! For
 ‘ nature does not at once reveal all her se-
 ‘ crets. We are apt to look on ourselves as
 ‘ already admitted into the sanctuary of her
 ‘ temple, we are still only in the porch. I
 ‘ have entered, adds he, into the thick and
 ‘ shady woods of nature, which are every
 ‘ where beset with thorns and briars. I
 ‘ have endeavored as much as possible to
 ‘ keep clear of them, but experience has
 ‘ taught me that there is no man so circum-
 ‘ spect as never to forget himself, and there-
 ‘ fore i have born with patience the sneers of
 ‘ the malevolent, and the buffoneries of those
 ‘ whose vivacity is exerted only to mo-
 ‘ lest and give offence to others. I have in
 ‘ spite of these insults, kept on steadily in
 ‘ my old path, and have finished the course
 ‘ I was destined for.’

The latter part of this passage, shews that

he has not been without his enemies, and that he hath suffered in the same way that all the most curious enquirers into nature have done in all ages. The tartness of his expressions, which is still stronger in the original, plainly proves that they have not used fair arguments against him, but like interested rivals, or men of a superficial understanding, have endeavored to subject him and his labours to ridicule. But whatever has been his fate in his own country, as far as I know, his name is almost universally mentioned with respect in all other parts of Europe. It is true, objections have been made to his innovations in other places besides Sweden^c,
which

^c Having since the first edition of these tracts met with Browellius' answer to Siegesbec, M. D. and botanical professor at Petersburg; who wrote against the sexual system of Linnæus, i cannot omit quoting one of his objections, which i imagine will divert the reader at the same time, that it may serve as an instance how far zeal for old notions will sometimes carry men. The objection is, that the laws of nature are overturned by Linnæus, since polygamy and adultery would be according to his system allowed in the vegetable world;

for

which must unavoidably happen on many accounts, but particularly because those natural historians who had been brought up and inured to other systems, who

for in some plants there are many filaments to one pistil. This is polygamy. In others there are female flowers, which are impregnated by the dust of male flowers, which have other female flowers belonging to them, i. e. which are already married. This is plainly adultery. Now according to professor Siegesbec, it is not credible that such confusion and detestable pollution should be tolerated in nature.

Browellius rightly observes in his answer, that Siegesbec had totally overlooked many instances of these enormities in the animal kingdom, and even the immorality of farmers and their wives, shepherds, jockies, sportsmen, nay even ladies of reputation, who in their ways promote these immoral and indecent practices.

However it must be observed in favor of this very scrupulous professor, that systems of philosophy, founded on facts have, been anathematized, and the authors and favorers of them condemned to the severest punishments, for reasons as little to the purpose as the foregoing of Siegesbec. To quote instances would be endless, as every one the least conversant in the history of learning will easily recollect them. But so moderate is the world now become, that I do not hear that the Linnæan system is looked on as heretical even at the court of Rome, though the professor has drawn some shrewd arguments against it from the book of Genesis.

had learned things by other names, and could not easily attain the new ones, must have strong prejudices arise on this occasion. This objection being personal i shall not consider it any farther, but readily allow that great indulgence is due to such people, and that their fate is to be pitied for coming into the world too soon to be enlightened farther on subjects, that perhaps had employed the greatest part of their life. But there are prejudices of another sort which i cannot omit to consider more fully on this occasion.

In order to this it must be premised, that the use and intent of a classcal system in any part of natural history, is not to range things according to their natural connections in regard to their outward aspects, or essential qualities, or their medicinal or œconomical properties, but to range them in such a manner that upon a plant, mineral or animal being shewn to a naturalist he may certainly, upon a due inspection of the object, give its true name according to some system. He who goes farther

farther than this is not barely a naturalist, but something more, viz. a physician, a chymist, a farmer, a gardener, &c. And he who cannot go thus far to a certain degree, does not deserve the name of a naturalist, however skillfull he may be in the vertues and properties of bodies animate and inanimate.

The use then and intent of a classical system is nothing more than that of a dictionary, where no one complains that words totally unconnected in sense are put near one another. The question therefore as to the sexual system^d, v. g. in plants, is not whether they be ranged naturally, but whether in the best manner possible in order to be known. Nay farther, it matters not whether the sexual system be founded on nature or not, i. e. whether there be any

^d At the end of the preface i have endeavored to explain the meaning of these terms in such a manner, that i think any curious person that will be at the pains to compare my explication with nature, cannot fail to understand perfectly what they mean in general. I thought this method would be more agreeable to the reader than to be referred to other books.

propagation by seeds without male and female organs of generation. The whole to be considered is whether those parts which are called, and, i believe truly called so, do really exist, and whether they they for the most part exist so uniformly, as to furnish marks sufficient to distinguish the classes, &c. by. Nor does it matter whether it be hard to distinguish those marks, but whether they can with proper care and patience be distinguished, and whether we can surely distinguish plants, without observing those nice and minute parts, and whether a system has been found equally sure with the Linnæan without having regard to those parts. Those who think so would do well to inform the world of their discovery, and not make objections that affect only the obscurity of nature, when they mean to condemn a system which is obscure merely from its consonancy to nature. If Providence has thought fit to write in cyphers, shall he be blamed who endeavors to give a key, to its works, because
some

some men cannot distinguish one stroke from another in the cypher?

Those who have not learned to read the characters of nature for want of leisure, patience, or any other cause, ought not to complain that Linnæus cannot make them skillfull in a part of knowledge they are not qualified for. If a man unacquainted with the learned languages wants to know the meaning of a Greek word, will he complain of the lexicon, because he cannot find it? certainly not. Neither ought we to complain of Linnæus in a similar case.

This i think is a full answer to all the objections that have or can be made to his system in general. What errors he has committed according to his own principles in relation to particulars is quite another question. I am one of those who think him not free from errors. Nor is it wonderfull that he should fall into some, but it is truly wonderfull that one man should be able to invent and carry so far so nice and extensive a system, especially when we consider not only what he has done in botany, but what he has done in all the branches of
natural

natural history besides, and some of them almost entirely neglected before his time. I should therefore wish that those who are fond of this part of knowledge would, instead of making frivolous objections, try by an accurate and diligent examination to rectify his mistakes, and thereby help to perfect a system which deserves the utmost attention, and commendation.

Tho' i said above that it matters not whether the sexual system be founded on nature or not ; yet it was natural for the inventor of it to endeavor by all proper means to vindicate it as likely to be so, and this he has done to the satisfaction of the most curious observers ; and i will venture to add, that it is natural for others likewise to embrace with zeal a system, that puts the works of Providence in so new and beautiful a light by continuing the analogy from the animate to the inanimate creation. It seems as if Providence intended to lead men to this discovery by striking our senses so intensely and so agreeably with those very parts which contain the clue of this system. Yet such is the inattention and
in-

inaccuracy of man on certain points, that even a tolerable conjecture concerning the use of those parts was not made till the year 1676.

Having finished all that I think necessary to say concerning Linnæus and his works, i shall now come to what relates immediately to myself only. First then as to the translation, I have endeavored to avoid making it too literal, and servile, but yet i hope without taking any undue liberties, or deviating from the sense of the originals.

The part which is likely to prove least agreeable to the reader, is that which was most troublesome to the translator. I mean the names of things not generally known. Some of these i have been obliged to leave in Latin, not being able to find any English names for them. I will not pretend to have avoided all mistakes on this head, but it is certain i should have committed more, as well as have had much more trouble, had it not been for the assistance of the ingenious Mr. Hudson, whose skill in all the branches of natural history, and particularly

cularly those relating to his profession as an apothecary, cannot fail to recommend him to the favor of the public. To him i likewise owe the ascertaining of some of the grasses, one of which, viz. the small bent grass which i had in my collection, but knew not where i found it, he discovered to be the *gramen minimum anglo-britanum*, mentioned in the *indculus plantarum dubiarum* at the end of Ray's Synopsis.

I must not omit also on this occasion to acknowledge my obligation to that excellent botanist Dr. Watson, for favoring me with the perusal of his collection of grasses, which was of no small service to me.

But to return to the translation ; I said that i did not pretend to have avoided all mistakes in relation to the names of things, i will now extend this farther, and own my suspicions that i may have made some in relation to other particulars, but i hope they are of such a kind only as may be looked on with indulgence by the learned, especially when they consider the great variety of sub-

jects treated on in these pages, of none of which subjects i profess to be a master, and therefore do not undertake to teach such readers ; but on the contrary shall always be ready and even desirous to receive instructions from them. I beg they will also consider that i do not aim at letting the unlearned into the mysteries of this part of knowledge, or even teaching them the elements of it. My business is only to excite curiosity, and therefore small errors can be of no consequence. What I have farther to say will be found in notes.

Res summas initio deberi parvo ac debili experientia omnium temporum testatur. Amænit. Acad. vol. 2. p. 266. §. 2.

End of the P R E F A C E.

IN order to explain the sexual system, I shall make use of the lilly, as that plant is almost every where to be found, and as the parts of generation are in that more obvious, than perhaps in any other flower. Upon opening the flower leaves there will appear in the very center, at the bottom, an oblong thickish substance with six furrows along its sides. This contains the seeds, and is called the

The germen or germ.

On this stands a small kind of pillar called

The style.

Which is terminated by a thickish triangular head, called

The stigma.

These all together from the female part of the flower, and are called by one name,

The pistil.

Round this pistil grow six long thready substances, called

The filaments,

Each terminated by an oblong body, that plays as on a pivot, upon the least motion

tion being given to the flower, and is called

The anthera.

This anthera contains the male dust, which when ripe is scattered about by every breath of air, and what happens to fall on the stigma, or upper part of the pistil, is supposed to enter thro' the style into the germ, and there impregnate the seed.

This plant is called an hermaphrodite, because the male and female organs of generation are contained within one flower. Most plants are hermaphrodites, like this, and have something analogous to what i have described above. Some plants have the male and female parts separate on the same individual ; others have male parts on one plant and female on another.

The part of the flower that contains honey is called

The nectary.

Only a few plants have this part, the lilly ; has it but as the knowledge of it is not necessary for understanding the following pieces, i shall not trouble the reader with a description of it.

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AN ORATION concerning the necessity of travelling in one's own countrey, made by Dr. LINNÆUS at Upsal, Oct. 17, anno 1741, when he was admitted to the royal and ordinary profession of physick.

Amænitat. Academ. vol. ii,

MOST honorable and most learned auditors of all orders, i am going to undertake a province, allotted to me by the favor of our most august, and most potent monarch, whose will it is that i preside over, and direct the study of physick in this University; and that i do my utmost to advance the glory of this illustrious body. May his choice be crowned with success, and may the great and good God favor my undertaking.

As by custom, delivered down by our forefathers, and prescribed by the laws of our aca-

demy, i am obliged upon undertaking this province to say something before so illustrious a circle of fathers and citizens ; i confess that all those circumstances, each of which is apt to strike terror into the mind of man, offer themselves together in a croud before my eyes on this occasion. For whether i consider the ampleness of the place, or the dignity of the audience, or the multitude of chosen people, or lastly my little talents in the arts of speech ; all these circumstances, i ingenuously confess, throw me into no small confusion.

For if the most eloquent men, when they come to speak in public, have been known to tremble, and become incapable of uttering a single word ; what must i feel who have none of the common advantages, either from art or nature, in the readiness and elegance of speech ?

However, since i am under a necessity of saying something, i must fly for refuge to that favor, and humanity, which you never refuse to those who speak on these occasions ; and thus i doubt not but that, however deficient i may be from want of talents, or want of exercise, i shall not wholly fail of the end i aim at. I shall therefore, most honorable auditors, undertake to treat on a subject neither unsuitable to the

the

the present occasion, nor to the office i am going to enter into, nor to that employment which i was lately engaged in by the will, and suffrage of the high, and mighty states of this kingdom; and from which i am now once again brought back to this seat of the muses. Nay so far is the subject, i am about to treat on, from being unsuitable to any of these circumstances, that it seems to me particularly adapted to every one of them. The subject is concerning the necessity of travelling in one's own countrey, and the advantages that may thence accrue, especially to physicians. I shall treat it in a plain and popular manner; and endeavor to manage it so, that the meanness of my language may be compensated by the dignity of the matter, and the brevity of my expressions.

All human knowledge is built on two foundations; reason and experience.—These two joyned together are necessary to make a good physician.

We must confess indeed, that the business of reasoning may be carried on with equal success in our closets, as in travelling, supposing we have an opportunity of conversing with men truly learned.

But it was experience, that sovereign mistress without which a physician ought to be ashamed to open his lips ; it was experience, i say, that consecrated to immortality so many of the antients, and amongst the rest that divine old man Hippocrates, whose writings were published many ages before christianity. The writings of this wonderful man alone, among so many ingeniously contrived systems, remain to this day, and will for ever remain firm, unmoved, unshaken, untouched by any decay, by any change. It is experience that has adorned with laurels the heads of so many celebrated physicians in all times, and even now adorns. And hence it is that the chief and most honorable title of physician is to be called a man of experience. Experience ought to go first ; reasoning should follow. The former furnishes the materials of knowledge ; the latter holds her consultations on the given phenomena ; and when she has weighed with judgment every circumstance, she discovers truth, and concludes, orders, and determines rightly about the point in question. Experience ought to be animated by reason in all physical affairs ; without this she is void of order, void of energy, void of life. On the other hand reason with-

without experience can do nothing ; being nothing, but the mere dreams, phantasms, and meteors of ingenious men who abuse their time. The antients certainly did not, any more than we, bring experience into the world with them. There is need of much diligence and labor, before man can be thoroughly instructed. Dioscorides confesses, that he undertook many journies in order to increase experience ; and the other fathers of physick in their writings frequently make mention of their travels either expressly or tacitly.

Academies were instituted to the end, that men well versed in all kinds of literature, and enriched besides by much experience, might be invited thither, and that the youth, who were ambitious of becoming learned, might flock together to those seats ; and have the advantage of improving no less by the experience, than by the erudition of the professors ; and these qualifications combined together, which is of all alliances the most pleasing, very justly deserve the utmost veneration and respect.

Vast and sumptuous libraries are erected in academies ; in which the observations of the learned, like so many legacies, and donations,

are preserved; that they who diligently give themselves up to study, may become endued with learning, polished, and confirmed by experience. These libraries are the repositories of wisdom, and their stores are laid open to every ingenious candidate.

Hospitals are founded that the candidates of physic may learn those things at the patients bed side, which cannot be learned from books; for here practice, and experience shew their force by means of the eyes, and hands; as he paints any object most accurately, who paints from the idea, which his own eyes afford him, and not from that, which he gets by the relation of another.

Anatomy schools are erected, that we may behold in another's body, as it were in a glass, the nature, and constitution of our own; as those conceive more clearly the situation of countries, districts, and cities, and the manners, rites, and customs of their inhabitants, who themselves have been there, and have seen what is remarkable amongst them with their own eyes, than he who relies solely upon the vague and imperfect maps, and relations of travellers.

Phyfic gardens are here cultivated ; where the plants of various kinds are collected from all parts of the globe, that we may by this means behold, as it were, the great in the little world.

Hither instruments for experimental philosophy are brought together, that the abstruse forces of the elements, which otherwise would escape our senses, may be made manifest, and that so we may successfully be let into the very recesses of nature ; as far as human penetration will admit of.

All these things are instituted in academies, that the youth may arrive at knowledge by experience ; all tend to this end, that tho' we be confined to one spot, one corner of the earth, we may examine the great and various stores of knowledge, and therein behold the immense domains of nature, and get acquainted with such things, as otherwise must be sought for, and oftentimes in vain, over the whole globe.

In my opinion therefore studying at academies ought by no means to be neglected, but rather should be looked on as necessary to those, who are ambitious of attaining wisdom, supported by experience. And those who endeavor

deavor to instill into the minds of young people a contempt for universities, and to withdraw the studious from these seats of learning, suggest very pernicious advice ; not considering that in these storehouses of knowledge much greater, and more excellent things may be attained by means of experience in a very short space of time, than by the most multifarious, most indefatigable, and most extensive reading at home all one's life.

If i may be allowed to speak what is really fact, this our university may contend with any foreign one whatever for true, and solid learning in all those parts of knowledge, which i have enumerated, owing to our noble, and exemplary institutions. For we begin to excell in botanical gardens, in hospitals, in apparatus's for experimental philosophy, in anatomical preparations, and other helps for arts and sciences, and to excell so much that we are likely in time, by the blessing of the almighty, to be inferior to no university.

Although some universities excell others on account of certain advantages peculiar to themselves ; for in proportion as one kind of knowledge in this, or that nation is held in greater, or less esteem, and is therefore
more

more or less cultivated, so the professors of it will be more or less skillful; as at this time the hospitals at London both for number and goodness exceed all others, at Paris chirurgical operations, at Leyden, anatomical preparations, at Oxford botanical collections; tho', i say, this may be the case, yet i cannot think, that those act prudently, or enough consult the good of themselves, and countrey, who seek for that abroad, which may be had at home, and who travel to foreign universities, before they have laid a sufficient foundation in their own countrey. And there is no doubt but that they who do so will at last repent of their error. He, who goes abroad raw, and ignorant, seldom returns more learned. Whereas, he, who has spent his time well at his own university, will never find reason to repent. Whoever has employed himself properly in the study of the arts, and sciences will become an usefull, and solid man in every branch of business. Whoever, before he sets out to visit regions warmed by other suns, has laid the first foundations of his studies in his native countrey, will be most likely to bring back materials of far greater price, than we usually see amongst the greatest part of our

travellers, who seldom return home laden with any thing, but fine sounding, and empty words collected out of the European languages. What do they learn, but to prate about theatres, and plays, and the modes of dress amongst the Italians, the Spaniards, the Germans, and above all the French? If they were well advised they would not stir a foot out of their own country; that they might not destroy their fortunes, their time, their health, nay their very life itself by luxury, and voluptuousness. They would not then return, as too frequently happens, entirely useless to themselves, and country, and a burthen upon the face of the earth, But whither am i hurried?

My design was, in the little time allotted me, to speak to you, gentlemen, not of the peculiar advantages of universities, or of sojourning at this, rather than any foreign one; but chiefly of travelling in one's own country, thro' its fields, and roads; a kind of travelling, i confess, hitherto little used, and which is looked upon as fit only for amusement. I once more, most honorable auditors, beg your patience, and that i may not forfeit all right to your favor, and benevolence, i promise to be as short as possible. You know what the poet says,

The

The farmer talks of grasses and of grain,

The sailor tells you stories of the main.

You ought not therefore to wonder, that i choose to make travelling in one's own country the subject of my discourse. Every one thinks well of what belongs to himself, and every one has pleasures peculiar to himself. I have travelled about, and passed over on foot the frosty mountains of Lapland, have climbed up the craggy ridges of Norland, and wandered along its steep hills, and almost impenetrable woods. I have made large excursions into the forests of Dalecarlia, the groves of Gothland, the heaths of Smoland, and the unbounded plains of Scania. There is scarcely any considerable province of Sweden, which i have not crawled thro' and examined; not without great fatigue of body and mind. My journey to Lapland was indeed an undertaking of immense labor; and i must confess, that i was forced to undergo more labor, and danger in travelling thro' this one tract of the northern world, than thro' all those foreign countries put together, which I have ever visited; tho' even these have cost me no small pains, and have not a little exhausted my vigor. But love to truth, and gratitude towards the supreme

preme being oblig'd me to confess, that no sooner were my travels finished, but, as it were, a Lethæan oblivion of all the dangers, and difficulties came upon me ; being rewarded by the inestimable advantages, which i reaped from those devious pursuits. Advantages, the more conspicuous for that i became daily more and more skillful, and gained a degree of experience, which I hope will be of use to myself, and others ; and, what i esteem above all other considerations ; as it comprehends in one all other duties, and charities ; to my country, and the public.

Good God ! how many, ignorant of their own country, run eagerly into foreign regions, to search out and admire whatever curiosities are to be found ; many of which are much inferior to those, which offer themselves to our eyes at home. I have yet beheld no foreign land, that abounds more with natural curiosities of all kinds, than our own. None which presents so many, so great, so wonderful works of nature ; whether we consider the magazines of snow heaped up for so many ages upon our Alps, and amongst these vast tracks of snow green meadows, and delicious vallies here and there peeping forth, or the lofty
heads

heads of mountains, the craggy precipices of rocks, or the sun lying concealed from our eyes for so many months, and thence a thick Cimmerian darkness spread over our hemisphere, or else at another season darting his rays continually along the horizon. The like to all which in kind, and degree, neither Holland, nor France, nor Britain, nor Germany, nor lastly any countrey in Europe can shew; yet thither our youth greedy of novelty flock in troops. But it was not my intent to speak of these things at present. I come now closer to my purpose, being about to shew by instances, that the natural philosopher, the mineralogist, the botanist, the zoologist, the physician, the farmer, and all others, initiated in any part of natural knowledge, may find in travelling thro' our own countrey things, which they will own they never dreamed of before. Nay things which to this day were never discovered by any person whatever. Lastly such things, as may not only gratify, and satiate their curiosity; but may be of service to themselves, their countrey, and all the world.

To give a few examples. The sagacious searcher after nature will find here, wherewithall to sharpen, and exercise his attention in be-

holding the top of mount Swucku, of so immense a height, that it reaches above the clouds. The wonderfull structure of mount Torsburg, the horrid precipices of the rock Blakulla in an island of that name, situated near Oeland, and that presents by its name, still used among the Suegothic vulgar, no less than by its dismal aspect, an idea of the stupidity, and superstition of that antient people.

Besides the wonderfull vaults, and caverns of the Skiula mountains, the high plains of the island Carolina, the unusual form and structure of the Kierkerfian fountains in Oeland; to pass over numberless other strange works of nature, the like to which perhaps are no where to be met with.

Where can we have greater opportunities, than in this Suegothic tract, of considering the intense rigor, and vehemence of winter, the incredible marble-like strength of ice? And yet in this inclement climate grain of all sorts is observed to spring forth sooner, grow quicker, and ripen in less time than in any other part of the world.^a

^a Vid. a treatise concerning the soliation of trees published in this collection, and the prolegomena to the *Flora Lapponica* of this author, where he says that at Purkyaur in Lapland anno 1732. barley sown May 31. was ripe July 28. i. e. in 58 days; and rye sown May 31. was ripe, and cut Aug. 5. i. e. in 66 days.

Whoever desires to contemplate the stupendous metamorphoses of sea, and land, will scarcely find any where a more convenient opportunity, than in the south, and east parts of Gothland; where the rock-giants, as they are called, seem to threaten heaven, and where the epocha's of time, the ages, the years, if i may so say, are as it were carved out in a surprising series upon the sea-shore, and the ground above the shore.

The philosopher will find room to exercise his ingenuity sufficiently in the Oeland-stone, by trying to discover how to overcome its moist nature, and quality, which whoever could accomplish would do no small service to his countrey, and above all would infinitely oblige the inhabitants of that place.

I shall say no more than what is known, and confessed by all the world, when i say that there is no countrey in the habitable part of the globe, where the mineralogist may make greater progress in his art, than in this our countrey. Let any one, that can, tell me, in what regions, more rich, and ample mines of metal are found, than in Sweden, and where they dig deeper into the bowels of the earth than here.

Let the mines of Norburg, the ridge of Tamburga, the pits of Dannemore, Bitsberg, Gren-gia, and lastly the immense treasures of Sal-bergen, and Fahluna be my witness, which exceed all in the known world.

Where do the possessors suffer foreigners more freely to approach their furnaces, and observe their operations? where are there men more ready to communicate their knowledge? Strangers are received by us with civility, and even pressed to stay.

Who would not shudder on beholding those forges, vomiting forth immense clouds of fire and smoak, where our iron ores are melted? who would not behold with pleasure the simple countreyman in the thick pine-groves of Dalecarlia, without furnace, without any apparatus, extracting an iron so very so fit for use, that it yields to no other, tho' prepared with the fiercest fires, and greatest expence?

Who ten years ago would have imagined, that the *lapis calaminaris* was to be had in Dalecarlia? or mines of the very best kind of gold in Smolandia?

You will perhaps scarce believe me when i tell you, that there are whole mountains full of *petroleum* in Dalecarlia. Yet doubt not. This
thing

thing hitherto unheard of, unseen, i myself saw with these eyes, and was surpris'd.

We admire the abundance of *coral* on the Indian shores; yet the port of Capellus in Gothland alone equals; nay exceeds those riches of the east. I have seen deep strata of *corals* extending many furlongs, many miles along its shores.

Botanists, who have travelled over the greatest part of the globe in search of the treasures of the vegetable kingdom, have yet left many plants for us and our posterity to discover in these our regions. For there is scarce any where a greater variety of *mosses*, *lichens*, *fuci*, and *fungi*; than with us; and the most curious botanists are now diligently employed in contemplating these minute plants.

Whoever beheld, or described our *diapensia*? who the *blasia* unless Micheli alone? These two kinds of plants grow with us, and the latter especially is found in great plenty about Fahluna. What traveller, that is not totally ignorant in botany, does not go from Paris to Fontainebleau to see those very rare *orchis*'s; some of which represent helmets, others knats, others flies; all of them so exactly, so wonderfully, that there seems nothing

wanting to make them the very animals themselves, but noise, and motion? Who imagined these flowers grew in our countrey, and in such plenty in Oeland, than they are to be met with in every field?

Who would ever have thought of looking in our countrey for the following exotics. The *winged pea*, the *great burnet*, the *perennial lettuce*, the *dwarf carline thistle*, the *middie fleabane*, the *black bellebore*, the *Illyric crowfoot*, much less the *riccia*, and herb *terrible*, and especially the *scorpion fena*, that most beautiful shrub, which in winter is carefully guarded against the frosts in the stoves of our botanists; yet all these have lately been observed to grow in Oeland and Gothland.

We used to purchase at a great price from forreigners the following medicinal plants, *vervain*, *moneywort*, &c. which all are natives of Sweden, and yet ten years ago nobody knew this.

What expences have we been at yearly to get the *glass-wort*, of whose ashes and salt, glass is made. The *dyers weed* and *woad* were purchased yearly at a very high price; plants that we have at last found grow every where about our provinces.

Lapland

Lapland alone furnished me some time ago with a hundred rare plants. I have gathered lately as many in the islands of the Baltic, and in Scania as many more, never before observed in Sweden. Nor can it be doubted, but that our other provinces conceal in their unfrequented corners other new plants, valuable for use or beauty, tho' hitherto overlooked, if a diligent and acute inquirer be not wanting. I will not say with the poet, "Happy the rural inhabitant," but "happy the Swedish inhabitant if he knew but what good he is possessed of^b."

The zoologist will no where meet with a place more delightful, and more suitable to his views, than that where flocks of all kinds of birds in spring time, and summer, gather

^b Our country has been searched by so many able botanists for plants, that what is said here cannot be applied to us. But a curious traveller might be of great service in relation to plants even here, by observing, and making generally known what plants are peculiarly cultivated in some countries. Thus for instance they sow *lotus*, 13. Linn. *birds-foot trefoil*, Ray syn. 334 in Herefordshire, which grows all over England on dry pastures, and is found very good for sheep, tho' every where else, as far as i know, neglected. Again they make great use of the *common vetch* in Gloucestershire, chiefly for horses, feeding them with it upon the spot, and eating it up time enough for turneps the same year.

together to breed. This is the case in the woody, and mountainous parts of Sweden, more than in any other spot of the earth; the Lapland *plover* called *pago*, the Norland *pied chaffinch*, the Oeland *tringa* called *alwar-grim*, the Gothland *duck* called *eider*, the artic *duck* of the island Carolina called *torde*, the Ottenbyensian *cobler's awl* called *sierfloecha*, the *picus tridactylus* of the Dalecarlians are all more rare in other countries than pheasants are with us. I may venture to affirm that no countrey upon the face of the earth abounds more with birds and insects, than Sweden. Wild *reindeer*, *flying squirrels*, and the Norway *rat* that pours down in troops from the mountains into the plains below are unknown, and perhaps happily unknown, any where else.

Forreigners come into the Dalecarlian mountains to catch *falcons*, as is well known.

In the island Farô, situated near Gothland, *whale* and *salmon* fishery is very conveniently carried on, and no where with greater profit.

How many species of fishes furnish our tables very common in Sweden, especially of the softmouthed kind; such as the *asp*, the *wimba*, the *faren*, the *biorkna*, the *mudd*, and
others,

others, unknown, undescribed, unseen in foreign countries. Who ever dissected, examined, described those minute *red serpents* called *asps*, or *æspingar* by the southern Swedes, whose bite communicates a deadly poison?

It would be tedious were i to descend to the species of insects. The great Reaumur, who has shewn a sagacity, and accuracy, before him unknown, in examining insects, upon seeing my collection of Swedish insects owned ingenuously, that my countrey alone contained more species of those animals, than any other known in the world.

The curious diætetic, whose business it is to inquire into the various ways of living among men, will scarcely find any place, where there are so many different kinds of food, as here. Here men vary in their food, as they vary in fortune, situation, and condition. And what is very remarkable, the inhabitants of this northern world have their peculiar customs, and rules of eating in every province, and territory. In Lapland they live without corn, or wine, without salt or any made liquor. Water, and flesh, and preparations of these are their only sustenance.

In some places the countreyman lives in his smoaky, and footy stove on the * *coregonus* when stinking; and bread made of the roots of the *calla*, or of the husks, and beards of grain pounded.

In some places they live upon stinking *ber-ring*, and *ropy* whey called *syra*; in other places on a food called *assu*, and *artfau*, and stinking *fish*; and yet they undergo much labor. In some places their food is *turneps*, and their drink made of *juniper berries*. Some live upon *peas*, others on *buck wheat*, others grow fat upon *whale's* flesh, to the astonishment of strangers.

In travelling thro' other countries you will hardly ever see so many different ways of living in this respect, as in the Swedish dominions, and where consequently the diætetic philosopher may have so many opportunities of making his experiments.

The pathologist, who inquires into the causes of distempers, will not lose his time in travelling into these countries; as in every dif-

* A general name of fishes, some species of which are known in England and Wales, as the *felbelley*, the *grayling*, the *gavinia*, &c. Vid. Artedi ichthyolog.

ferent province men are subject to peculiar diseases, which arise in a great measure from the different kinds of food, that prevail among them. He will no doubt hence be empowered to assign the true causes; why the Norlander is infected with the scurvy, and why the Laplander on the contrary is free from it: why the same Laplander is subject to those terrible gripes, called by them *ullem*; why the Gothlander is chiefly afflicted with the hypochondriacal colic; why the West-Bothnians, who are more prolific than any other people in our part of the world, lose most of their children in the cradle; why so many people are liable to the epilepsy in the territory of Verns, for the cause is slight in appearance, but very singular in its nature.

Why almost all the males in Orslobæa dye of consumptions before the age of 30.

To enumerate all the things, which we have particular opportunities of observing in relation to these affairs in our countrey, would require no short treatise.

I am fully persuaded that it is absolutely necessary for the young physician to travel thro' his own countrey, were it only for this reason, that relying upon his own strength he
might

might daily become more diligent, gain experience, without which there can be no skill in physic, and bring the art which he professes to some degree of perfection. For it happens amongst us, and perhaps no where so frequently, that our common people have confidence in their physicians, and run in crowds to consult any one, that is known to have taken a doctor's degree; in other countries they will scarcely trust a young physician with a favorite dog.

By following this course, and entering into practice, the young physician will perceive, whether medicines, oftentimes celebrated beyond all bounds of moderation, have that effect upon the patient, which we find mentioned in practical books. He will hear of many domestic remedies, unknown elsewhere, in use among the country people, that are looked upon as specifics, and preferred to the most costly prescriptions; for during the consultation, the patient may reveal the secret, if the physician is prudent, and makes use of a little art.

What are those famous exotic remedies brought from either Indies, and purchased at so great a price. v. g. *sarsaparilla*, a

spe-

species of *smilax*, *ipecacuanba*, a species of *boney-suckle*, *acmella*, a species of *hemp agrimony*, *contrayerva* of *dorstenia*, and *simoruba* of *pi-stacia*, which in some diseases are reckoned specifics? what are all these, I say, but remedies approved by long use amongst the vulgar? and are not innumerable remedies used among our own countrey people of the same nature? were not all those I have enumerated found out by ^d barbarians, and when experience had shewn, that they were useful, and efficacious in many diseases, were they not thought worthy to be communicated to the rest of mankind? Let our young physician then learn,

* Vid. *Vires plantarum Amœnitat. academ. vol. i. p. 403.* where Brunnerus is quoted for saying, that barbarians have done more towards the advancement of physic, than the learned of all ages. In the same passage the following words of Tournefort are quoted, *que tout le travail des hommes n'a encore rien produit de si assuré que deux ou trois drogues que les sauvages trouvent dans les bois.* The author subjoins to these quotations a list of twenty medicines with an &c. taken from barbarous nations, now used in our shops.

The curious reader may find in Dampier's voyages a very extraordinary instance of the skill of the savages of America in the chirurgical way. Wafer there gives an account of a cure performed upon himself by these people, and his testimony is the stronger, as he was a surgeon himself.

not to condemn, but accurately to remark those remedies, which are cried up amongst the common people. For he who boasts of knowing more of the virtues of simples, than what ^e taste, smell, ^f fructification, and experiments will suggest, vehemently deceives, or is deceived.

Ye who intend one of these days to cultivate your native soil with advantage, and profit, may be assured that you will find nothing in all the books of husbandry, that will be of such assistance to you in that art, as travelling thro' the different provinces of this kingdom. In some parts, and those the most barren, you

^e Vid. *Amœnit. academ.* vol. 2. p. 371. in an express treatise on this subject the author quotes several eminent physicians both ancient and modern, who maintained the same opinion as to tastes. And vol. 3. p. 183. where the assistance to be had from smell is considered, and the effects of odors amply treated on.

^f Fructification. The reader perhaps may be at a loss to understand this. The meaning of it is, that plants which agree in the genus and even in the class agree also in their virtues. Thus the leaves of all the grasses are good for cattle, the lesser seeds for small birds, the greater for man, and this without exception. The stellated plants of Ray are diuretic, the rough-leaved plants of the same author are astringent and vulnerary. Plants with a pea-flower are all wholesome for cattle and man, &c. Vid. a curious treatise on this subject, in the *Academ.* vol. 1. p. 389.

will

will see very considerable crops produced by the force of skill, and industry. In others, tho' by nature extremely fertile, you will scarcely see any appearance of crops; and the inhabitants live poorly, and in a miserable condition, merely from carelessness, and indolence. You may observe how far the Cuprimontani exceed all others in the management of hay, and grass, and the Gothlanders in relation to cattle, and particularly sheep.

You will have an opportunity of noting the different ways in different places of ploughing, manuring, harrowing, sowing, reaping, gathering, drying, and threshing, from whence a prudent traveller may judge which way is best.

It would be absurd indeed to apply to our lands foreign methods of husbandry in every particular, v. g. foreign grass seed would not succeed so well as our own. Yet i will venture to say one could scarcely travel a day in any of our countries without learning something of use in œconomy. Many things that will occur, may appear trifling at first sight, which yet upon a more mature consideration, you will own may be turned to very great advantage; such as the various ways of cloathing, preparing victuals,

tuals, feeding cattle, not to mention the manners, commerce and numberless other particulars.

Lastly, however necessary and incumbent upon us it may be to take a view of our country, it will be in vain to undergo this trouble, if we do not lay the foundation of our studies at the university, as to natural philosophy, natural, and medical history; without which preparation for travelling to advantage every thing that occurs, will appear trite, common, and not worth our attention. The traveller however, above all men, ought to keep in mind that famous principle of Descartes, viz. to doubt about every thing. He must also be very cautious not to suffer his mind, from too eager a desire of knowledge, to be overwhelmed at the beginning by the number of things to be observed^s. * * * * *

* * * * *

We ought to travel in the flower of our age, while the mind, and body are in vigor, while our strength is unimpaired, and alacrity at its height; before a family, household affairs,

^s Here follow some few lines in the original, which not understanding I have omitted.

and conjugal ties have engrossed our affections.

When by this method you have laid the first foundation of travelling in your own countrey, you will then be qualified to go farther, and become serviceable to yourselves, and the public, by learning those things abroad, which could not be learned at home ; and thus, having made a fair examination, you may be enabled to judge, whether our own customs may be improved by the help of forreign ones, and how far ; and thus you will not be apt rashly to imagine, that every fashion which prevails at Paris, is fit to be introduced into our cottages ; lastly, thus you will not be better acquainted with the manners and customs in France, England, Germany, and other countries, than with those of your own ; i. e. you will not, as the proverb says, for want of common sense,

Invert all order, and become

Lynxes abroad, mere moles at home.

But not to abuse your patience any longer, i here break off the thread of my discourse, that what time remains may be employed by me in expressing my wishes and thanks. First, to thee, O omnipotent God, i humbly offer
up

up my thanksgiving, for the immense benefits, that have been heaped upon me thro' thy gracious protection, and providence. Thou from my youth upwards hast so led me by the hand, hast so directed my footsteps, that i have grown up in the simplicity, and innocence of life, and in the most ardent pursuit after knowledge. I give thee thanks for that thou hast ever preserved me in all my journies thro' my native and forreign countries, amidst so many dangers, that surrounded me on every side. That in the rest of my life, amidst the heaviest burthens of poverty, and other inconveniences, thou wast always present to support me with thy almighty assistance. Lastly that amidst so many vicissitudes of fortune, to which I have been exposed, amongst all the goods, i say, and evils, the joyfull and gloomy, the pleasing, and disagreeable circumstances of life, thou endowdest me with an equal, constant, manly, and superior spirit on every occasion.

To our most august, and potent prince Frederick the first, as becomes a dutifull, and obedient subject, i give most humble thanks for his favorable kindness in bestowing upon me this honorable post. May the almighty grant, that his majesty, and his most serene consort,
those

those shining stars of the north, may long, very long illuminate, and adorn this region with the brightness of their rays.

To thee, most mighty count Gyllenbourg, illustrious chancellor of this university, to thee, though absent, i return the most sincere, and humble thanks for the great, and even endless benefits bestowed upon me; amongst which, exceeding all number, this must not be reckoned the least, that, when I was called hither by this academy, you recommended me in the most indulgent manner to our great monarch. It shall be my constant care that you may never repent of this favor, and by reverence, respect, and duty, to testify my gratitude to my latest breath.

To the most reverend the archbishop, to the vice-chancellor, to the magnificent rector, and to you illustrious and celebrated professors, i return also most grateful acknowledgments, who honored me by your unanimous votes, and assisted in bringing me to this chair. As this your benevolence laid me under the greatest obligation to you, to employ every office of regard and friendship towards you, so by the grace of God i shall omit no opportunity of shewing i am not unworthy of your favor.

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Wmst

Whilst i am thus employed in testifying the feelings of a grateful mind, i ought not to forget your name, most illustrious Roberg, my predecessor highly worthy of the utmost veneration. As i am one of those who have had the happiness of being educated in your school, i should be the most ungratefull of men, if i were ever to suffer the remembrance of such a benefit to slip out of my mind.

It has been your lot, venerable sir, to survive all your brethren; and you may justly boast, what every physician now in Sweden will gratefully confess, that to you, as to their faithful instructor, they owe the beginning, the increase, and the finishing of their art. Nay not only the faculty at Upsal, but the whole circle here present ought to salute, and reverence you as superior to them all in age.

Suffer then at last your disciple to ease you of that burthen, which for forty years, and more, you have sustained, with honor; that now, time having laid his heavy hand upon you, you may enjoy that rest, which his sacred majesty has kindly granted to your wishes. My sincere prayers are not wanting to the almighty, that he may grant you a chearfull, and vigorous old age, and that
every

every thing may succeed to the utmost of your desires.

Nor is it fit, ye flourishing and chosen youth, that on this solemn occasion i should pass you over in silence. I have been long sensible of your regard for me, by many, and undoubted proofs ; i have been long sensible, i say, and i gratefully acknowledge it. Many of you desired, ardently desired to have me in this station, though perhaps never seen by you before. For this alone, i know, i am called hither, that i may be useful to you. On you therefore my fortune turns. My industry, my studies, my labors, my watchings, i willingly, and cheerfully consecrate to your service, and by the assistance of God, i will exert the utmost of my power to satisfy your expectations, that you may not be disappointed in the hopes you have conceived of me.

THE
OECONOMY
OF
NATURE.

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THE
OE C O N O M Y
O F
N A T U R E.

BY
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Æternæ sunt vices rerum. Sen. nat. 3. 1.

§. I.

BY the Œconomy of Nature we understand the all-wise disposition of the Creator in relation to natural things, by which they are fitted to produce general ends, and reciprocal uses.

All things contained in the compass of the universe declare, as it were, with one accord the infinite wisdom of the Creator. For whatever strikes our senses, whatever is the object

of our thoughts, are so contrived, that they concur to make manifest the divine glory, i. e. the ultimate end which God proposed in all his works. Whoever duly turns his attention to the things on this our terraqueous globe, must necessarily confess, that they are so connected, so chained together, that they all aim at the same end, and to this end a vast number of intermediate ends are subservient. But as the intent of this treatise will not suffer me to consider them all, i shall at present only take notice of such as relate to the preservation of natural things. In order therefore to perpetuate the established course of nature in a continued series, the divine wisdom has thought fit, that all living creatures should constantly be employed in producing individuals; that all natural things should contribute and lend a helping hand to preserve every species; and lastly, that the death and destruction of one thing should always be subservient to the restitution of another. It seems to me that a greater subject than this cannot be found, nor one on which laborious men may more worthily employ their industry, or men of genius their penetration.

I am very sensible, being conscious of my own weakness, how vast and difficult a subject it is, and how unable i am to treat it as it deserves ; a subject which would be too great a task for the ability of the most experienced and sagacious men, and which properly performed would furnish materials for large volumes, My design therefore is only to give a summary view of it, and to set forth to the learned world, as far as i am able, whatever curious, worthy to be known, and not obvious to every observer occurs in the triple kingdom of nature. Thus if what the industry of others shall in future times discover in this way be added to these observations, it is to be hoped, that a common stock may thence grow, and come to be of some importance. But before i examine these three kingdoms of nature, it will not, i think, be amiss to say something concerning the earth in general, and its changes.

§. 2.

The world, or the terraqueous globe, which we inhabit, is every where surrounded with elements, and contains in its superficies the three kingdoms of nature, as they are called; the *fossil*,
sil,

fil, which constitutes the crust of the earth, the *vegetable*, which adorns the face of it, and draws the greatest part of its nourishment from the *fossil* kingdom, and the *animal*, which is sustained by the *vegetable* kingdom. Thus these three kingdoms cover, adorn and vary the superficies of our earth. It is not my design to make any inquiry concerning the center of the terraqueous globe. He, who likes hypotheses, may consult Descartes, Helmont, Kircher, and others. My business is to consider the external parts of it only, and whatever is obvious to the eye.

As to the *strata* of the earth and mountains, as far as we have hitherto been able to discover, the upper parts consist of *rag-stone*, the next of *slate*, the third of *marble* filled with petrifications, the fourth again with *slate*, and lastly the lowest of *free-stone*. The habitable part of the earth, though it is scooped into various inequalities, yet is every where high in comparison with the water, and the farther it is from the sea, it is generally higher. Thus the waters in the lower places are not at rest, unless some obstacle confines them, and by that means form lakes, and marshes.

The sea surrounds the continent, and takes up the greatest part of the earth's superficies,

as geography informs us. Nay, that it once spread over much the greatest part, we may be convinced by its yearly decrease, by the rubbish left by the tides, by *shells*, *strata*, and other circumstances.

The sea-shores are usually full of dead testaceous animals, wrack, and such like bodies, which are yearly thrown out of the sea. They are also covered with sand of various kinds, stones, and heaps of other things not very common. It happens moreover, that while the more rapid rivers rush through narrow valleys, they wear away the sides, and thus the friable, and soft earth falls in, and its ruins are carried to distant, and winding shores; whence it is certain, that the continent gains no small increase, as the sea subsides.

The clouds collected from exhalations, chiefly from the sea, but likewise from other waters, and moist grounds, and condensed in the lower regions of the atmosphere, supply the earth with rain; but since they are attracted by the mountainous parts of the earth, it necessarily follows, that those parts must have, as is fit, a larger share of water than the rest. Springs, which generally rush out at the foot of mountains, take their rise from
this

this very rain water, and vapours condensed, that trickle through the holes, and interstices of loose bodies, and are received into caverns.

These afford a pure water purged by straining, which rarely dry up in summer, or freeze in winter, so that animals never want a wholesome and refreshing liquor.

The chief sources of rivers are fountains, and rills growing by gradual supplies into still larger and larger streams, till at last, after the conflux of a vast number of them, they find no stop, but falling into the sea with lessened rapidity, they there deposit the united stores they have gathered, along with foreign matter, and such earthy substances, as they tore off in their way. Thus the water returns in a circle, whence it first drew its origin, that it may act over the same scene again.

Marshes arising from water retained in low grounds are filled with mossy tumps, which are brought down by the water from the higher parts, or are produced by putrified plants.

We often see new meadows arise from marshes dried up. This happens sooner when the *sphagnum* F. S. 864.* has laid a founda-

* A kind of moss.

* This refers to the first Edition of the *Flora Suecica*. It is 958 in the second Edition.

tion ; for this in procefs of time changes into a very porous mould, till almoft the whole marfh is filled with it. After that the *ruſſ* ſtrikes root, and along with the *cotton graſſes* conſtitutes a turf, raiſed in ſuch a manner, that the roots get continually higher, and thus lay a more firm foundation for other plants, till the whole marfh is changed into a fine and delightfull meadow ; eſpecially if the water happens to work itſelf a new paſſage.

Hillocks, that abound in low grounds, occaſion the earth to increaſe yearly, more than the countreyman would wiſh, and ſeem to do hurt : but in this the great induſtry of nature deſerves to be taken notice of. For by this means the barren ſpots become ſooner rich meadow, and paſture land. Theſe hillocks are formed by the ant, by ſtones, and roots, and the trampling of cattle ; but the principal cauſe is the force of the winter cold, which in the ſpring raiſes the roots of plants ſo high above the ground, that being expoſed to the air they grow, and periſh ; after which the *golden maidenbairs* fill the vacant places.

Mountains, hills, vallies, and all the inequalities of the earth, though ſome think they take away much from its beauty, are ſo far

from producing such an effect, that on the contrary they give a more pleasing aspect, as well as great advantages. For thus the terrestrial superficies is larger; different kinds of plants thrive better, and are more easily watered, and the rain-waters run in continual streams into the sea, not to mention many other uses in relation to winds, heat and cold. Alps are the highest mountains, that reach to the second region of the air, where trees cannot grow erect. The higher these Alps are, the colder they are *cæteris paribus*. Hence the Alps in Sweden, Siberia, Swisserland, Peru, Brasil, Armenia, Asia, Africa, are perpetually covered with snow; which becomes almost as hard as ice. But, if by chance the summer heats be greater than ordinary, some part of these stores melts, and runs through rivers into the lower regions, which by this means are much refreshed.

It is scarcely to be doubted, but that the rocks and stones dispersed over the globe were formed originally in, and from the earth; but when torrents of rain have softened, as they easily do, the soluble earth, and carried it down into the lower parts, we imagine it happens that these solid, and heavy bodies, being
laid

laid bare, stick out above the surface. We might also take notice of the wonderfull effects of the tide, such as we see happen from time to time on the sea-shore, which being daily and nightly assaulted with repeated blows, at length gives way, and breaks off. Hence we see in most places the rubbish of the sea, and shores.

The winter by its frost prepares the earth, and mould, which thence are broken into very minute particles, and thus, being put into a mouldering state, become more fit for the nourishment of plants; nay by its snow it covers the seeds, and roots of plants, and thus by cold defends them from the force of cold. I must add also that the piercing frost of the winter purifies the atmosphere, and putrid waters, and makes them more wholesome for animals.

The perpetual succession of heat and cold with us renders the summers more pleasing; and though the winter deprives us of many plants, and animals, yet the perpetual summer within the tropics is not much more agreeable, as it often destroys men, and other animals by its immoderate heat; though it must be confessed

feſſed that thoſe regions abound with moſt exquisite fruits. Our winters, though very troubleſome to a great part of the globe, on account of their vehement, and intense cold, yet are leſs hurtfull to the inhabitants of the northern parts, as experience teſtifies. Hence it happens, that we may live very conveniently on every part of the earth, as every different countrey has different advantages from nature.

The ſeaſons, like every thing elſe, have their viciffitudes, their beginnings, their progreſs, and their end.

The age of man begins from the cradle, pleaſing childhood ſucceeds, then active youth, afterwards manhood firm, ſevere and intent upon ſelf-preſervation, laſtly old age creeps on, debilitates, and at length totally deſtroys our tottering bodies.

The ſeaſons of the year proceed in the ſame way. Spring, the jovial, playfull infancy of all living creatures, repreſents childhood and youth ; for then plants ſpread forth their luxuriant flowers, fiſhes exult, birds ſing, every part of nature is intent upon generation. The ſummer, like middle age, exhibits plants, and trees every where cloathed with green ; it
gives

gives vigor to animals, and plumps them up, fruits then ripen, meadows look cheerfull, every thing is full of life. On the contrary autumn is gloomy, for then the leaves of trees begin to fall, plants to wither, insects to grow torpid, and many animals to retire to their winter quarters. The day proceeds with just such steps, as the year. The morning makes every thing alert, and fit for business; the sun pours forth his ruddy rays, the flowers which had, as it were, slept all night, awake and expand themselves again; the birds with their sonorous voices, and various notes make the woods ring, meet together in flocks, and sacrifice to Venus. Noon tempts animals into the fields, and pastures; the heat puts them upon indulging their ease, and even necessity obliges them to it. Evening follows, and makes every thing more sluggish; flowers shut up, ^h and animals retire to their lurking

^h Of such flowers as sleep by night some account is given by Linnæus in *Philos. Botan.* p. 88. where the curious may also find p. 274. a list of plants one or other of which shut their flowers at every hour of the day without regard to the weather. One plant is so remarkable for this property, that it is generally known in our countrey by the name of go-to-bed-at-noon. Its botanical name is *tragopogon* or goat's-beard. See a Dissertation in the *Amæn. acad.* vol. 4. where this subject is treated at large.

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places.

places. Thus the spring, the morning, and youth are proper for generation; the summer, noon, and manhood are proper for preservation; and autumn, evening, and old age are not unfitly likened to destruction.

§. 3.

The fossil kingdom.

Propagation.

It is agreed on all hands, that stones are not organical bodies, like plants, and animals; and therefore it is as clear that they are not produced from an egg, like the tribes of the other kingdoms. Hence the variety of fossils is proportionate to the different combinations of coalescent particles, and hence the species in the fossil kingdom are not so distinct, as in the other two. Hence also the laws of generation in relation to fossils have been in all ages extremely difficult to explain; and lastly hence have arisen so many different opinions about them, that it would be endless to enumerate them all. We therefore for the present will content ourselves with giving a very few observations on this subject.

That

That clay is the sediment of the sea is sufficiently proved by observation, for which reason it is generally found in great plenty along the coasts.

The journals of seamen clearly evince, that a very minute sand covers the bottom of the sea, nor can it be doubted, but that it is daily crystallised out of the water.

It is now acknowledged by all, that testaceous bodies and petrifications resembling plants were once real animals or vegetables; ⁱ and it seems likely that shells being of a calcareous nature have changed the adjacent clay, sand, or mould into the same kind of substance. Hence we may be certain that marble may be generated from petrifications, and therefore it is frequently seen full of them.

Rag-stone the most common matter of our rocks appears to be formed from a sandy kind of clay, but this happens more frequently, where the earth is impregnated with iron.

Freestone is the product of sand, and the deeper the bed, where it is found, the more compact it becomes; and the more dense the

ⁱ I have taken the liberty not to follow the original text in this place. The learned will see the reason at first sight.

sand, the more easily it concretes. But if an *alkaline* clay chances to be mixed with the sand, the *freestone* is generated more readily, as in the *freestone* called *cos friatilis, particulis argillo-glarenfis*, S. N. 1. 1.

The *flint*, S. N. 3. 1. is almost the only kind of *stone*, certainly the most common in *chalky* mountains. It seems therefore to be produced from *chalk*. Whether it can be reduced again to *chalk*, i leave to others to inquire.

Stalactites, S. N. 33. 1. or *drop-stone* is composed of calcareous particles, adhering to a dry and generally a vegetable body.

The incrustations S. N. 32. 5, 6, 7, 8. are often generated, where a vitriolic water connects clayey and earthy particles together.

Slate by the vegetables, that are often inclosed in it, seems to take its origin from a marshy mould.

Metals vary according to the nature of the matrix, to which they adhere, e. g. the *pyrites cupri Fahlunensis* contains frequently *sulphur*, *arsenic*, *iron*, *copper*, a little *gold*, *vitriol*, *alum*, sometimes *lead ore*, *silver* and *zinck*. Thus *gold*, *copper*, *iron*, *zinck*, *arsenic*, *pyrites*, *vitriol* come out of the same vein. That very rich *iron ore* at Normark in Vermelandia, where

it was cut transversely by a vein of clay, was changed into a pure *silver*. The number therefore of species, and varieties of *fossils*, each serving for different purposes, according to their different natures, will be in proportion, as the different kinds of earths and *stones* are variously combined.

§. 4.

Preservation.

As *fossils* are destitute of life, and organisation, are hard, and not obnoxious to putrefaction; so they last longer, than any other kind of bodies. How far the air contributes to this duration it is easy to perceive, since air hardens many *stones* upon the superficies of the earth, and makes them more solid, compact, and able to resist the injuries of time. Thus it is known from vulgar observation that *lime*, that has been long exposed to the air, becomes hardened. The *chalky marl*, which they use in Flanders for building houses, as long as it continues in the quarry, is friable; but when dug up and exposed to the air, it grows gradually harder. In the same way our old walls, and towers gain a firmness in process of time,

and therefore it is a vulgar mistake, that our ancestors excelled the modern architects in the art of building as to this point ^k.

However ignorant we may be of the cause, why large rocks are every where to be seen split, whence vast fragments are frequently torn off; yet this we may observe, that fissures are closed up by water, that gets between them, and is detained there; and are consolidated by *crystal* and *spar*. Hence we scarcely ever find *crystal*, but in those *stones*, which have for some time in its chinks water loaded with stony particles. In the same manner *crystals* fill the cavities in mines, and concrete into *quartz* or a debased *crystal*.

It is manifest that *stones* are not only generated, augmented, and changed perpetually

^k Too great stress ought not, I think, to be laid on this observation of our author, though it may be in part true; for without supposing that our ancestors had more skill in building, we may suppose, what was likely to be the case, that they used more care in the choice of their materials, and had them wrought up with more labor; which must add considerably to the firmness of the cement. Where these circumstances have happened to be wanting, time alone has not been able to produce the same effect. I have seen a house about fourscore years old, where one might rub out the mortar from between the bricks without scarcely using any force.

from incrustations brought upon moss, but are also increased by *crystal* and *spar*. Not to mention that the adjacent earth, especially if it be impregnated with iron particles, is commonly changed into a solid *stone*.

It is said, that the *marble quarries* in Italy, from whence fragments are cut, grow up again. *Ores* grow by little and little, whenever the mineral particles, conveyed by the means of water through the clefts of mountains, are retained there ; so that adhering to the homogeneous matter a long while, at last they take its nature, and are changed into a similar substance.

§. 5.

Destruction.

Fossils, although they are the hardest of bodies, yet are found subject to the laws of destruction, as well as all other created substances. For they are dissolved in various ways by the elements exerting their force upon them, as by water, air and the solar rays, as also by the rapidity of rivers, violence of cataracts, and eddies which continually beat upon and at last reduce to powder the hardest *rocks*. The agi-

tations of the sea, and lakes, and the vehemence of the waves, excited by turbulent winds pulverise *stones*, as evidently appears by their roundness along the shore. Nay as the poet says,

The hardest stone insensibly gives way

To the soft drops, that frequent on it play.

So that we ought not to wonder, that these very hard bodies moulder away into powder, and are obnoxious like others to the consuming tooth of time.

Sand is formed of *freestone*, which is destroyed partly by frost, making it friable, partly by the agitation of water, and waves; which easily wear away, dissolve, and reduce into minute particles, what the frost had made friable.

Chalk is formed of rough *marble*, which the air, the sun, and the winds have dissolved, as appears by Iter. Goth. 170.

The *slate* earth or *humus schisti* Syf. Nat. 511. owes its origin to *slate*, dissolved by the air, rain and snow.

Ochre is formed of metals dissolved, whose *fæces* present the very same colours, which we always find the *ore* tinged with, when exposed to the air. *Vitriol* in the same

I should consider that the
 further a substance is exposed to the
 air, the more it is dissolved by the action of the
 man-

manner mixes with water from *ores* destroyed.

The *muria saxatilis* Syf. Nat. 14. 6. a kind of talky stone yielding salt in the parts that are turned to the sun, is dissolved into sand, which falls by little and little upon the earth, till the whole is consumed; not to mention other kinds of *fossils*. Lastly from these there arise new *fossils*, as we mentioned before, so that the destruction of one thing serves for the generation of another.

Testaceous worms ought not to be passed over on this occasion, for they eat away the hardest *rocks*. That species of *shell fish* called the *razor shell* bores thro' stones in Italy, and hides itself within them; so that the people who eat them are obliged to break the stones, before they can come at them. The *cochlea* F. S. 1299. a kind of *snail* that lives on craggy *rocks*, eats, and bores through the chalky hills, as worms do through wood. This is made evident by the observations of the celebrated de Geer.

§. 6.

The Vegetable Kingdom.

Propagation.

Anatomy abundantly proves, that all *plants* are *organic*, and living bodies; and that all *organic* bodies are propagated from an egg has been sufficiently demonstrated by the industry of the moderns. We therefore the rather, according to the opinion of the skilfull, reject the æquivocal generation of *plants*; and the more so, as it is certain that every living thing is produced from an egg. Now the seeds of *vegetables* are called eggs; these are different in every different *plant*, that the means being the same, each may multiply its species, and produce an offspring like its parent. We do not deny, that very many *plants* push forth from their roots fresh offsets for two or more years. Nay not a few *plants* may be propagated by branches, buds, suckers and leaves fixed in the ground, as likewise many trees. Hence their stems being divided into branches, may be looked on as roots above ground; for in the same way the roots creep under ground; and

and divide into branches. And there is the more reason for thinking so, because we know that a tree will grow in an inverted situation, viz. the roots being placed upwards, and the head downwards, and buried in the ground; for then the branches will become roots, and the roots will produce leaves, and flowers. The *lime-tree* will serve for an example, on which gardeners have chiefly made the experiment. Yet this by no means overturns the doctrine, that all *vegetables* are propagated by seeds; since it is clear that in each of the foregoing instances nothing vegetates but what was part of a plant, formerly produced from seed, so that, accurately speaking, without seed no new *plant* is produced.

Thus again *plants* produce seeds, but they are entirely unfit for propagation, unless fecundation precedes, which is performed by an intercourse between different sexes, as experience testifies. *Plants* therefore must be provided with *organs* of generation; in which respect they hold an analogy with *animals*. Since in every *plant* the flower always precedes the fruit, and the fecundated seeds visibly arise from the fruit; it is evident that the *organs* of generation are contained in the flower,
which

which *organs* are called *antheræ*, and *stigmata*, and that the impregnation is accomplished within the flower. This impregnation is performed by means of the dust of the *antheræ* falling upon the moist *stigmata*, where the dust adheres, is burst, and sends forth a very subtle matter, which is absorbed by the *style*, and is conveyed down to the rudiment of the seed, and thus renders it fertile. When this operation is over, the *organs* of generation wither and fall, nay a change in the whole flower ensues. We must however observe, that in the *vegetable kingdom* one, and the same flower does not always contain the *organs* of generation of both sexes, but oftentimes the male *organs* are on one *plant*, and the female on another. But that the business of impregnation may go on successfully, and that no plant may be deprived of the necessary dust, the whole most elegant *apparatus* of the *antheræ* and *stigmata* in every flower is contrived with wonderful wisdom.

For in most flowers the *stamina* surround the *pistills*, and are about the same height; but there are many *plants*, in which the *pistill* is longer than the *stamina*, and in these it is wonderfull to observe, that the Creator
has

has made the flowers recline, in order that the dust may more easily fall into the *stigma*, e. g. in the *campanula*, *cowslip*¹, &c. But when the fœcundation is compleated the flowers rise again, that the seeds may not fall out before they are ripe, at which time they are dispersed by the winds. In other flowers on the contrary the *pistill* is shorter, and there the flowers preserve an erect situation, nay when the flowering comes on they become erect; tho' before they were drooping, or immersed under water. Lastly, whenever the male flowers are placed below the female ones, the leaves are exceedingly small, and narrow, that they may not hinder the dust from flying upwards, like smock; as we see in the *pine*, *fir*, *yew*, *sea-grape*, *juniper*, *cypress*, &c. and when in one and the same species one plant is male, and the other female, and consequently may be far from one another, there the dust, without which there is no impregnation, is carried in abundance by the help

¹ This curious phænomenon did not escape the poetical eye of Milton, who was so very much struck with the beauty of it, that he thought it worth describing in the following enlivened imagery,

With cowslips wan that hang the pensive head.

of the wind from the male to the female; as in the whole *dioicous*^m class. Again a more difficult impregnation is compensated by the longævity of the individuals, and the continuation of life by buds, suckers and roots, so that we may observe every thing most wisely disposed in this affair. Moreover we cannot without admiration observe that most flowers expand themselves when the sun shines forth, whereas when clouds, rain, or the evening comes on, they close up, lest the genital dust should be coagulated, or rendered useless, so that it cannot be conveyed to the *stigmata*. But what is still more remarkable and wonderfull! when the fœcundation is over, the flowers neither upon flowers, nor evening coming on close themselves up. Hence when rain falls in the flowering time, the husbandman and gardener foretell a scarcity of fruits. I could and would illustrate all this by many remarkable instances, if the same subject had not lately been explained, in this very placeⁿ in a manner equal to its

^m i.e. where one plant bears male flowers, and the other female ones.

ⁿ I suppose the author here alludes to a treatise published in Amæn. academ. vol. 1. entitled, *Sponsalia plantarum*, in which are contained so many proofs of the reality of the different sexes of plants, that to me there seems to remain no room for doubt.

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importance. I cannot help remarking one particular more, viz. that the organs of generation, which in the animal kingdom are by nature generally removed from sight, in the vegetable are exposed to the eyes of all, and that when their nuptials are celebrated, it is wonderful what delight they afford to the spectator by their most beautiful colours and delicious odors. At this time bees, flies, and other insects suck honey out of their nectaries, not to mention the humming bird; and that from their effete dust the bees gather wax.

§. 7.

As to the dissemination of seeds, after they come to maturity, it being absolutely necessary; since without it no crop could follow; the Author of nature has wisely provided for this affair in numberless ways. The stalks and stems favor this purpose, for these raise the fruit above the ground, that the winds, shaking them to and fro, may disperse far off the ripe seeds. Most of the ⁿ *pericarps* are shut at

ⁿ Whatever surrounds the seeds is called by botanical writers a *pericarpium*, and as we want an English word to express this, I have taken the liberty to call it a pericarp.

top, that the seeds may not fall, before they are shook out by stormy winds. Wings are given to many *seeds*, by the help of which they fly far from the mother plant, and oftentimes spread over a whole countrey. These wings consist either of a down, as in most of the composite flowered plants, or of a membrane, as in the *birch*, *alder*, *ash*, &c. Hence *woods*, which happen to be consumed by fire, or any other accident, will soon be restored again by new plants, disseminated by this means. Many kinds of fruits are endued with a remarkable elasticity, by the force of which, the ripe *pericarps* throw the *seeds* to a great distance, as the *wood-sorrel*, the *spurge*, the *phyllanthus*, the *dittany*. Other *seeds* or *pericarps* are rough, or provided with hooks; so that they are apt to stick to animals, that pass by them, and by this means are carried to their holes where they are both sown, and manured by nature's wonderfull care; and therefore the plants of these *seeds* grow, where others will not, as *bounds-tongue*, *agrimony*, &c.

Berries and other *pericarps*, are by nature allotted for aliment to animals, but with this condition, that while they eat the pulp they shall sow their *seeds*; for when they feed upon it

it they either disperse them at the same time, or, if they swallow them, they are returned with interest; for they always come out unhurt. It is not therefore surprising, that if a field be manured with recent mud or dung not quite rotten, various other plants, injurious to the farmer, should come up along with the grain, that is sowed. Many have believed that *barley*, or *rye* has been changed into *oats*, altho' all such kinds of metamorphoses are repugnant to the laws of generation, not considering that there is another cause of this phenomenon, viz. that the ground perhaps has been manured with horse-dung, in which the *seeds* of *oats*, coming entire from the horse, lye hid and produce that grain. The *mistletoe* always grows upon other trees, because the thrush that eats the seeds of it, casts them forth with its dung, and as bird-catchers make their bird-lime of this same plant, and daub the branches of trees with it, in order to catch the thrush, the proverb hence took its rise;

The thrush, when he befouls the bough,
Sows for himself the seeds of woe.

It is not to be doubted, but that the greatest part of the *junipers* also, that fill our woods,

are sown by thrushes, and other birds in the same manner; as the berries, being heavy, cannot be dispersed far by the winds. The cross-bill that lives on the fir-cones, and the hawfinch that feeds on the pine-cones, at the same time sow many of their *seeds*, especially when they carry the *cone* to a stone, or trunk of a tree, that they more easily strip it of its scales. Swine likewise, by turning up the earth, and moles by throwing up hillocks, prepare the ground for seeds in the same manner, as the ploughman does.

I pass over many other things, which might be mentioned concerning the sea, lakes, and rivers, by the help of which oftentimes *seeds* are conveyed unhurt to distant countries; nor need I mention in what a variety of other ways nature provides for the dissemination of plants, as this subject has been treated on at large in our illustrious president's oration concerning the augmentation of the habitable earth. ^P

§. 8.

^P As there is something very ingenious, and quite new in the treatise here referred to, I will for the sake of those, who cannot read the original, give a short abstract of it. His design is to shew that there was only one pair of all living things, created at the beginning. According to the
account

§. 8.

Preservation.

The great Author and Parent of all things, decreed, that the whole earth should be covered with plants, and that no place should be

F 2

void,

account of Moses, says the author, we are sure, that this was the case in the human species; and by the same account we are informed that this first pair was placed in Eden, and that Adam gave names to all the animals. In order therefore that Adam might be enabled to do this, it was necessary that all the species of animals should be in paradise; which could not happen unless also the species of vegetables had been there likewise. This he proves from the nature of their food, particularly in relation to insects, most of which live upon one plant only. Now had the world been formed in its present state, it could not have happened that all the species of animals should have been there. They must have been dispersed over all the globe, as we find they are at present, which he thinks improbable for other reasons which I shall pass over for the sake of brevity. To solve all the phænomena then he lays down a principle, that at the beginning all the earth was covered with sea, unless one island large enough to contain all animals and vegetables. This principle he endeavors to establish by several phænomena which make it probable, that the earth has been and is still gaining upon the sea, and does not forget to mention *fossil shells*, and *plants* every where found, which he says cannot be accounted for by the deluge. He then undertakes to shew
how

void, none barren. But since all countries have not the same changes of seasons, and every soil is not equally fit for every plant, He therefore, that no place should be without

how all vegetables and animals might in this island have a soil and climate proper for each, only by supposing it to be placed under the æquator, and crowned with a very high mountain. For it is well known that the same *plants* are found on the Swiss, the Pyrenean, the Scotch alps, on Olympus, Lebanon, Ida, as on the Lapland and Greenland alps. And Tournefort found at the bottom of mount Ararat the common plants of Armenia, a little way up those of Italy, higher those which grow about Paris, afterwards the Swedish plants, and lastly on the top the Lapland *alpine plants*; and i myself, adds the author, from the plants growing on the Dalecarlian alps could collect how much lower they were than the alps of Lapland. He then proceeds to shew how from one plant of each species the immense number of individuals now existing might arise. He gives some instances of the surprizing fertility of certain plants, v. g. the elecampane, one plant of which produced 3000 seeds, of spelt, 2000, of the sunflower 4000, of the poppy 3200, of tobacco 40320. But supposing any annual plant producing yearly only two seeds, even of this after 20 years there would be 1,048,576 individuals. For they would increase yearly in a duple proportion, viz. 2, 4, 8, 16, 32, &c. He then gives some instances of plants brought from America, that are now become common over many parts of Europe. Lastly he enters upon the subject for which he is quoted in the text, where the detail he gives of the several methods which nature has taken to propagate vegetables is extremely curious, but too long to insert in this place.

some,

same, gave to every one of them such a nature, as might be chiefly adapted to the climate; so that some of them can bear an intense cold, others an equal degree of heat; some delight in dry ground, others in moist, &c. Hence the same plants grow only where there are the same seasons of the year, and the same soil.

The *alpine* plants live only in high, and cold situations, and therefore often on the *alps* of Armenia, Switzerland, the Pyreneans, &c. whose tops are equally covered with eternal snows, as those of the Lapland *alps*, plants of the same kind are found, and it would be in vain to seek for them any where else. It is remarkable in relation to the *alpine* plants, that they blow, and ripen their *seeds* very early, otherwise the winter would steal upon them on a sudden, and destroy them.

Our northern plants, altho' they are extremely rare every where else, yet are found in Siberia, and about Hudson's bay, as the *arbutus*, *Flor.* 339. *bramble* 412. *winter-green*, &c.

Plants impatient of cold live within the torrid zones; hence both the Indies tho' at such a distance from one another have plants in com-

mon. The Cape of Good Hope, i know not from what cause, produces plants peculiar to itself, as all the *mesembryanthema*, and almost all the species of *aloes*. *Grasses*, the most common of all plants, can bear almost any temperature of air, in which the good providence of the Creator particularly appears; for all over the globe they above all plants are necessary for the nourishment of cattle, and the same thing is seen in relation to our most common grains.

Thus neither the scorching sun, nor the pinching cold hinders any countrey from having its vegetables. Nor is there any soil, which does not bring forth many kinds of plants; the *pond-weeds*, the *water-lily*, *lobelia* inhabit the waters. The *fluviales*, *fuci*, *conservæ* cover the bottoms of rivers, and sea. The *sphagna*^a fill the marshes. The *brya*^r cloath the plains. The dryest woods and places scarce ever illuminated by the rays of the sun are adorned with the *bypna*. Nay stones and the trunks of trees are not excepted, for these are covered with various kinds of *liverwort*.

The desert, and most sandy places have their peculiar trees, and plants; and as rivers or

^a Kind of mofs.

^r Kind of mofs.

brooks are very seldom found there, we cannot without wonder observe that many of them distill water, and by that means afford the greatest comfort both to man, and beasts that travel there. Thus the ' *tillandsia*, which is a *parasitical plant*, and grows on the tops of trees in the desarts of America, has its leaves turned at the base into the shape of a pitcher, with the extremity expanded; in these the rain is collected, and preserved for thirsty men, birds, and beasts.

The *water-tree* in Ceylon produces cylindrical bladders, covered with a lid; into these is secreted a most pure, and refreshing water, that tastes like nectar to men, and other animals. There is a kind of *cuckow-pint* in New-France, that if you break a branch of it, will afford you a pint of excellent water. How wise, how beautiful is the agreement between the plants of every countrey, and its inhabitants, and other circumstances.

' A kind of *mistletoe*,

§. 9.

Plants oftentimes by their very structure contribute remarkably both to their own preservation, and that of others. But the wisdom of the Creator appears no where more, than in the manner of growth of *trees*. For as their roots descend deeper, than those of other *plants*, provision is thereby made, that they shall not rob them too much of nourishment; and what is still more, a stem not above a span in diameter often shoots up its branches very high; these bear perhaps many thousand buds, each of which is a *plant* with its *leaves*, *flowers* and *stipulæ*. Now if all these grew upon the plain, they would take up a thousand times as much space, as the *tree* does, and in this case there would scarcely be room in all the earth for so many *plants*, as at present the *trees* alone afford. Besides *plants* that shoot up in this way are more easily preserved from cattle by a natural defence, and farther their leaves falling in autumn cover the *plants* growing about against the rigor of the winter, and in the summer they afford a pleasing shade, not only to animals, but to *plants*, against the intense heat of the sun. We may add that

trees

trees like all other *vegetables* imbibe the water from the earth, which water does not circulate again to the root, as the ancients imagined^{*}; but being dispersed, like small rain, by the transpiration of the leaves, moistens the *plants* that grow about. Again, many *trees* bear fleshy fruits of the *berry* or *apple* kind, which, being secure from the attack of cattle, grow ripe for the use of man, and other animals, while their seeds are dispersed up and down after digestion. Lastly the particular structure of *trees* contribute very much to the propagation of insects; for these chiefly lay their eggs upon their leaves, where they are secure from the reach of cattle.

Ever-green trees, and *shrubs* with us are chiefly found in the most barren woods, that they may be a shelter to animals in the winter. They lose their leaves every third year, as their seeds are sufficiently guarded by the *mosses*, and do not want any other covering. The *palms* in the hot countries perpetually keep their leaves, for there the seeds stand in no need of any shelter whatever.

^{*} See *Vegetable Statics* by that great philosopher Dr. Hales, where this subject is treated in a masterly way.

Many *plants*, and *shrubs* are armed with thorns, e. g. the *buck-thorn*, *floe*, *carduus*, *cotton-thistle*, &c. that they may keep off the animals, which otherwise would destroy their fruit. These at the same time cover many other *plants*, especially of the annual kind, under their branches". So that while the adjacent grounds are robbed of all *plants* by the voracity of animals, some may be preserved, to ripen flowers and fruit, and stock the parts about with seeds, which otherwise would be quite extirpated.

All *herbs* cover the ground with their leaves, and by their shade hinder it from being totally deprived of that moisture, which is necessary to their nourishment. They are moreover an ornament to the earth, especially as leaves have a more agreeable verdure on the upper, than the under side.

The *mosses*, which adorn the most barren places, at the same time preserve the lesser plants, when they begin to shoot, from cold and drought. As we find by experience in our

" This observation may be extended farther; for it is constantly seen upon commons, where *furze* grows, that wherever there was a bush left untouched for years by the commoners, some *tree* has sprung up, being secured by the prickles of that *shrub* from the bite of the cattle.

gardens, that *plants* are preserved in the same way. They also hinder the fermenting earth from forcing the roots of *plants* upwards in the spring; as we see happen annually to trunks of trees, and other things put into the ground. Hence very few *mosses* grow in the warmer climates, as not being so necessary to that end in those places.

The English *sea mat-weed* or *marran* will bear no soil but pure sand, which nature has allotted to it. Sand the produce of the sea, is blown by winds oftentimes to very remote parts, and deluges, as it were, woods and fields. But where this grass grows, it frequently fixes the sand, gathers it into hillocks, and thrives so much, that by means of this alone, at last an entire hill of sand is raised. Thus the sand is kept in bounds, other *plants* are preserved free from it, the ground is increased ^w,

^w This observation is found in Linn. Flor. Lapp. p. 62. where he says the Dutch sow this grass on their sand banks, that the sand may not overwhelm the neighboring parts. I do not see why this experiment should not be tryed on the barren sands in Norfolk, where I am assured by credible witnesses, that the small cottages are sometimes totally buried under sand during high winds. This grass grows plentifully along the sea shores in England. Vid. Ray, 323. 1.

and the sea repelled by this wonderful disposition of nature.

How solicitous nature is about the preservation of grasses is abundantly evident from hence, that the more the leaves of the perennial grasses are eaten, the more they creep by the roots, and send forth off-sets. For the Author of nature intended, that *vegetables* of this kind, which have very slender, and erect leaves, should be copious, and very thick-set, covering the ground like a carpet; and thus afford food sufficient for so vast a quantity of grazing animals. But what chiefly increases our wonder is, that although the grasses are the principal food of such animals, yet they are forbid, as it were, to touch the flower, and seed-bearing stems; that so the seeds may ripen and be sown.

The *caterpillar* or *grub* of the *moth*, Faun. Sue. 826. called *græfmasken*, although it feeds upon grasses, to the great destruction of them, in meadows; yet it seems to be formed, in order to keep a due proportion between these and other plants; for grasses, when left to grow freely, increase to that degree, that they exclude all other plants; which would consequently be extirpated, unless this insect sometimes

times prepared a place for them, Hence always more species of *plants* appear in those places where this caterpillar has laid waste the pastures the preceding year, than at any other time.

§. 10.

Destruction.

Daily experience teaches us, that all *plants* as well as all other living things, must submit to death.

They spring up, they grow, they flourish, they ripen their fruit, they wither, and at last, having finished their course, they die, and return to the dust again, from whence they first took their rise. Thus all black mould, which every where covers the earth, for the greatest part is owing to dead *vegetables*. For all roots descend into the sand by their branches, and after a *plant* has lost its stem the root remains; but this too rots at last, and changes into mould. By this means this kind of earth is mixed with sand, by the contrivance of nature, nearly in the same way as dung thrown upon fields is wrought into the earth by the industry of the husbandman. The earth thus
pre-

prepared offers again to *plants* from its bottom, what it has received from them. For when seeds are committed to the earth, they draw to themselves, accommodate to their nature, and turn into *plants*, the more subtle parts of this mould by the co-operation of the sun, air, clouds, rains, and winds; so that the tallest tree is, properly speaking, nothing but mould wonderfully compounded with air, and water, and modified by a virtue communicated to a small seed by the Creator. From these *plants*, when they die, just the same kind of mould is formed, as gave birth to them originally; but in such a manner, that it is in greater quantity than before. *Vegetables* therefore increase the black mould, whence fertility remains continually uninterrupted. Whereas the earth could not make good its annual consumption, unless it were constantly recruited by new supplies.

The crustaceous *liverworts* are the first foundation of *vegetation*, and therefore are *plants* of the utmost consequence in the œconomy of nature, though so despised by us. When rocks first emerge out of the sea, they are so polished by the force of the waves, that
 scarce

scarce any herb can find a fixed habitation upon them; as we may observe every where near the sea. But the very minute crustaceous *liverworts* begin soon to cover these dry rocks, although they have no other nourishment, but that small quantity of mould, and imperceptible particles, which the rain and air bring thither. These *liverworts* dying at last turn into a very fine earth; on this earth the * imbricated *liverworts* find a bed to strike their roots in. These also dye after a time, and turn to mould; and then the various kinds of mosses, e. g. the *hypna*, the *brya*, *politricba* find a proper place, and nourishment. Lastly these dying in their turn, and rotting afford such a plenty of new formed mould, that herbs and shrubs easily root, and live upon it.

That trees when they are dry or are cut down may not remain uselefs to the world, and lye, as it were, melancholy spectacles, nature hastens on their destruction in a singular way: first the *liverworts* begin to strike root in them; afterwards the moisture is drawn out of them;

* I have used this word because we have no English one of the same meaning unless it be the word *scaly*, that I know of. However imbricated means parts lying over parts like tiles, as in the cup of the *thistle flower*.

whence putrefaction follows. Then the *must-room* kinds find a fit place for nourishment on them, and corrupt them still more. The *beetle* called the *dermestes*, next makes himself a way between the bark, and the wood. The *musk-beetle*, the *copper talc beetle*, and the *caterpillar* or *coffus* 812. bores an infinite number of holes through the trunk. Lastly the *wood-peckers* come, and while they are seeking for insects, wear away the tree, already corrupted; till the whole passes into earth. Such industry does nature use to destroy the trunk of a tree! Nay trees immersed in water would scarcely ever be destroyed, were it not for the worm that eats ships, which performs this work; as the sailor knows by sad experience.

Thistles, as the most usefull of plants, are armed, and guarded by nature herself. Suppose there were a heap of clay, on which for many years no plant has sprung up; let the seeds of the *thistle* blow there, and grow, the *thistles* by their leaves attract the moisture out of the air, send it into the clay by means of their roots, will thrive themselves, and afford a shade. Let now other plants come hither, and they will soon cover the ground. St. Bielke.

All succulent plants make ground fine, of a good quality, and in great plenty, as *sedum*, *crassula*, *aloe*, *algæ* *. But dry plants make it more barren, as *ling* or *heath*, *pinet*, *moss*; and therefore nature has placed the succulent plants on rocks, and the dryest hills.

§. II.

The animal kingdom.

Propagation.

The generation of animals holds the first place among all things, that raise our admiration, when we consider the works of the Creator; and that appointment particularly, by which he has regulated the conception of the *fœtus*, and its exclusion, that it should be adapted to the disposition, and way of living of each animal, is most worthy of our attention.

We find no species of animals exempt from the stings of love, which is put into them to the end, that the Creator's mandate may be executed, *increase and multiply*; and that thus

* A kind of *grass* *wrack*,

the egg, in which is contained the rudiment of the *fœtus* may be fœcundated ; for without fœcundation all eggs are unfit to produce an offspring.

Foxes and *wolves*, struck with these stings, every where howl in the woods ; crowds of *dogs* follow the female ; *bulls* shew a terrible countenance, and very different from that of *oxen*. *Stags* every year have new horns, which they lose after rutting time. Birds look more beautifull than ordinary, and warble all day long through lasciviousness. Thus *small birds* labour to outsing one another, and *cocks* to outcrow. *Peacocks* spread forth again their gay, and glorious trains. *Fishes* gather together, and exult in the water ; and *grasshoppers* chirp, and pipe as it were, amongst the herbs. The *ants* gather again into colonies, and repair to their citadels². I pass over many other particulars, which this subject affords, to avoid prolixity.

² See this subject treated with great spirit in Thomson's Spring and in Virgil's Georgics.

§. 12.

The fœcundated egg requires a certain, and proportionate degree of heat for the expansion of the *stamina* of the *embryo*. That this may be obtained, nature operates in different manners, and therefore we find in different classes of animals a different way of excluding the *fœtus*.

The females of *quadrupeds* have an *uterus*, contrived for easy gestation, temperate and cherishing warmth, and proper nourishment of the *fœtus*, as most of them live upon the earth, and are there fed.

Birds, in order to get subsistence, and for other reasons, are under a necessity of shifting place; and that not upon their feet but wings. Gestation therefore would be burthensome to them. For this reason they lay eggs, covered with a hard shell. These they sit upon by a natural instinct, and cherish till the young one comes forth.

The *ostrich* and *cassowary* are almost the only birds, that do not observe this law; these commit their eggs to the sand, where the intense heat of the sun excludes the *fœtus*.

Fishes inhabit cold waters, and most of them have cold blood ; whence it happens that they have not heat sufficient to produce the *fœtus*. The all-wise Creator therefore has ordained, that most of them should lay their eggs upon the shore ; where, by means of the solar rays, the water is warmer, and also fitter for that purpose ; because it is there less impregnated with salt, and consequently milder ; and also because water-insects abound more there, which afford the young fry a nourishment.

Salmons in the like manner, when they are about to lay their eggs, are led by instinct to go up the stream, where the water is fresh and more pure.

The *butterfly fish* is an exception, for that brings forth its *fœtus* alive.

The *fishes of the ocean*, which cannot reach the shores by reason of the distance, are also exempt from this law. The Author of nature to this kind has given eggs that swim ; so that they are hatched amidst the swimming *fucus*, called *sargazo*. Flor. Zeilon. 389.

The *cetaceous* fish have warm blood, and therefore they bring forth their young alive, and suckle them with their teats.

Many

Many *amphibious* animals bring forth live *fatufes*. As the *viper*, and the *toad*, &c. But the species that lay eggs, lay them in places, where the heat of the sun supplies the warmth of the parent.

Thus the rest of the *frog* kind and the *lizard* kind, lay their eggs in warm waters; the common *snake* in dunghills, and such-like warm places, and give them up to nature, as a provident nurse, to take care of them. The *crocodile*, and *sea tortoises* go ashore to lay their eggs under the sand, where the heat of the sun hatches them.

Most of the *insect* kind neither bear young nor hatch eggs; yet their tribes are the most numerous of all living creatures; insomuch that if the bulk of their bodies were proportionate to their quantity, they would scarce leave room for any other kinds of animals. Let us see therefore with what wisdom the Creator has managed about the propagation of these minute creatures. The females by natural instinct meet and copulate with the males; and afterwards lay their eggs, but not indiscriminately in every place; for they all know how to choose such places as may supply their offspring in its tender age with nourishment, and

other things necessary to satisfy their natural wants; for them other, soon after she has laid her eggs, dyes, and were she to live she would not have it in her power to take care of her young.

Butterflies, moths, some beetles, weevils, bugs, cuckow-spit insects, gall-insects, tree bugs, &c. lay their eggs, on the leaves of plants, and every different tribe chooses its own species of plant*. Nay there is scarce any plant, which does not afford nourishment to some insect; and still more, there is scarcely any part of a plant, which is not preferred by some of them. Thus one insect feeds upon the flower; another upon the trunk; another upon the root; and another upon the leaves. But we cannot help wondering particularly, when we see how the leaves of some trees, and plants, after eggs have been let into them, grow into galls; and form dwellings, as it were, for the young ones, where they may conveniently live. Thus when the *gall-insect* called *cynips*, Fn. 947. has fixed her eggs in the leaves of an oak, the wound of the leaf swells, and a knob like an apple arises, which includes and nourishes the embryo.

* Vid. Syst. Nat. Edit. 10. Fauna Suecica; and Hospita Insectorum Flora Aman. Academ. vol. 3.

When the *tree-bug*, Faun. Suec. 700. has deposited its eggs in the boughs of the fir tree, excrescences arise shaped like peas. When another species of the *tree-bug*, Fn. 695. has deposited its eggs in the *mouse-ear chickweed* or the *speedwell*, Fl. 12. the leaves contract in a wonderful manner into the shape of a head. The *water-spider*, Fn. 1150. excludes its eggs either on the extremities of the *juniper*, which from thence forms a lodging, that looks like the *arrow-headed grass*, or on the leaves of the *poplar*, from whence a red globe is produced. The *tree-louse*, Fn. 1355. lays its eggs on the leaves of black poplar, Fl. 821. which from thence turn into a kind of inflated bag, and so in other instances. Nor is it upon plants only that insects live, and lay their eggs. The *knats*, Fn. 1116. commit theirs to stagnating waters. The water insect called *monoculus*, Fn. 1182. often increases so immensely on pools, that the red legions of them have the appearance of blood. Others lay their eggs in other places, e. g. the *beetle* in dunghills. The *dermestes* in skins. The *flesh fly* in putrified flesh. The *cheese-maggot* in the cracks of cheese, from whence the *caterpillars* issuing forth oftentimes consume the whole cheese,

and deceive many people, who fancy the worms are produced from the particles of the cheese itself, by a generation called æquivocal, which is extremely absurd. Others exclude their eggs upon certain animals. The *mill-beetle* Fn. 618. lays its eggs between the scales of fishes. The *species of glad-fly* Fn. 1024. on the back of cattle. The *species* 1025 on the back of the rhen deer. The *species* 1026 in the noses of sheep. The *species* 1028 lodges during the winter in the intestinal tube, or the throat of horses, nor can it be driven out till the summer comes on. Nay *insects* themselves are often surrounded with the eggs of other insects, insomuch that there is scarcely an animal to be found, which does not feed its proper insect, not to say any more of all the other places, where they deposit their eggs. Almost all the eggs of *insects*, when laid, are ordained to undergo, by a wonderfull law of nature, various metamorphoses, e. g. the egg of the *butterfly* being laid in the cabbage first of all becomes a *caterpillar*, that feeds upon the plant, crawls, and has sixteen feet. This afterwards changes into a *nymph*, that has no feet, is smooth, and eats nothing; and lastly this bursts into a *butterfly*, that flies, has variety of colours, is rough, and

and lives upon honey. What can be more worthy of admiration, than that one, and the same animal should appear on the stage of life under so many characters, as if it were three distinct animals^a.

The laws of generation of *worms* are still very obscure, as we find they are sometimes produced by eggs, sometimes by offsets, just in the same manner as happens to trees. It has been observed with the greatest admiration, that the *polypus* or *hydra* S. N. 221. lets down shoots and live branches, by which it is multiplied. Nay more, if it be cut into many parts, each segment, put into the water, grows into a perfect animal; so that the parts which were torn off are restored from one scrap.

§. 13.

The multiplication of animals is not tyed down to the same rules in all; for some have a remarkable power of propagating, others are

^a Linnæus Amæn. academ. vol. 2. in a treatise on the wonders relating to insects, says, “as surprising as these transformations may seem, yet much the same happens when a chicken is hatched, the only difference is, that the chicken breaks all three coats at once, the butterfly one after another,

confined within narrower limits in this respect. Yet in general, we find, that nature observes this order, that the least animals, and those which are usefull, and serve for nourishment to the greatest number of other animals, are endued with a greater power of propagating than others^b.

Mites, and many other insects will multiply to a thousand within the compass of a very few days. While the *elephant* scarcely produces one young in two years.

The *hawk* kind generally lay not above two eggs, at most four, while the *poultry* kind rise to 50.

The *diver* or *loon*, which is eaten by few animals, lays also two eggs, but the *duck* kind, the *moor game*, *partridges*, &c. and *small birds* lay a very large number.

If you suppose two *pigeons* to hatch nine times a year, they may produce in four years 14672 young^c. They are endued with this

^b Herodotus speaking of the flying serpents in Arabia makes the same reflection, and attributes this course of nature to the divine providence. Thal.

^c I have given this passage as it stands in the original. The numbers ought to have been 14760, or the expression should have been altered; for he includes the first pair.

He supposes it generally known that pigeons hatch but two eggs at a time, and that they pair.

remarkable fertility, that they may serve for food, not only to man, but to hawks and other birds of prey *. Nature has made harmless and esculent animals fruitfull. Plin. Nature has forbid the *bird* kind to fall short of the number of eggs allotted to each species, and therefore if the eggs which they intend to sit upon, be taken away a certain number of times, they presently lay others in their room, as may be seen in the swallow, duck, and small birds.

§. 14.

Preservation.

Preservation follows generation ; this appears chiefly in the tender age, while the young are unable to provide for their own support. For then the parents, though otherwise ever so fierce in their disposition, are affected with a wonderfull tenderness or sense of love towards their progeny, and spare no pains to provide for, guard, and preserve them, and that not by an imaginary law, but one given by the Lord of nature himself.

Quadrupeds give suck to their tender young and support them by a liquor, perfectly easy of digestion, till their stomachs are able to digest,

* Vid. Muschenbr. Orat. de Sap. Divin.

and their teeth are fit to chew more solid food. Nay their love toward them is so great, that they endeavour to repell with the utmost force every thing, which threatens danger, or destruction to them. The *ewe* which brings forth two *lambs* at a time, will not admit one to her teats, unless the other be present, and suck also; lest one should famish, while the other grows fat.

Birds build their nests in the most artificial manner, and line them as soft as possible, for fear the eggs should get any damage. Nor do they build promiscuously in any place; but there only, where they may quietly lye concealed and be safe from the attacks of their enemies.

The *hanging bird*, Act. Bonon. vol. 2. makes its nest of the fibres of withered plants, and the down of the poplar seeds, and fixes it upon the bough of some tree hanging over the water; that it may be out of reach.

The *diver*, Fn. 123. places its swimming nest upon the water itself amongst the rushes. I designedly pass over many other instances of the like kind.

Again birds sit on their eggs with so much patience, that many of them choose to perish
with

with hunger, rather than expose the eggs to danger by going to seek for food.

The male *rooks* and *crows* at the time of incubation bring food to the females.

Pigeons, *small birds*, and other *birds*, which pair, sit by turns; but where polygamy prevails, the males scarcely take any care of the young.

Most of the *duck* kind pluck off their feathers in great quantity, and cover their eggs with them, lest they should be damaged by the cold, when they quit their nests for the sake of food; and when the young are hatched, who knows not how solicitous they are in providing for them, till they are able to fly, and shift for themselves?

Young *pigeons* would not be able to make use of hard seeds for nourishment, unless the parents were to prepare them in their crops, and thence feed them.

The *eagle owl* makes its nest on the highest precipices of mountains, and in the warmest spot, facing the sun; that the dead bodies brought there may by the heat melt into a soft pulp, and become fit nourishment for the young.

The *cuckow* lays its eggs in the nest of other small birds, generally the *wagtail*,^d or^e *hedge-sparrow*, and leaves the incubation, and preservation of the young to them. But that these young, when grown up, degenerate into hawks, and become so ungratefull, that they destroy their nurses, is a mere vulgar error, for it is contrary to their nature to eat flesh.

Amphibious animals, fishes and insects, which cannot come under the care of their parents, yet owe this to them, that they are put in places, where they easily find nourishment, as we have observed.

^d This custom of the cuckow is so extraordinary, and out of the common course of nature, that it would not be credible, were it not for the testimony of the most knowing and curious natural historians, such as Ray, Willughby, Gesner, Aldrovandus, Aristotle, &c.

Much has been said by the writers on birds about the fate of the young birds, in whose nest the cuckow is hatched, but as i find nothing but mere conjecture, it would not be worth while transcribing.

^e Hedge sparrow. Linnæus seems to have taken the white-throat for the hedge-sparrow.

§. 15.

As soon as animals come to maturity, and want no longer the care of their parents, they attend with the utmost labor, and industry, according to the law and œconomy appointed for every species, to the preservation of their lives. But that so great a number of them, which occur every where, may be supported, and a certain and fixed order may be kept up amongst them, behold the wonderfull disposition of the Creator, in assigning to each species certain kinds of food, and in putting limits to their appetites. So that some live on particular species of plants, which particular regions, and soils only produce. Some on particular animalcula, others on carcases, and some even on mud and dung. For this reason Providence has ordained, that some should swim in certain regions of the watery element, others should fly; some should inhabit the torrid, the frigid, or the temperate zones, and others should frequent desarts, mountains, woods, pools or meadows, according as the food proper to their nature is found in sufficient quantity. By this means there is no terrestrial tract,

tract, no sea, no river, no countrey, but what contains, and nourishes various kinds of animals. Hence also an animal of one kind cannot rob those of another kind of its aliment; which, if it happened, would endanger their lives or health; and thus the world at all times affords nourishment to so many, and so large inhabitants, at the same time that nothing, which it produces, is useless or superfluous.

I think it will not be amiss to produce some instances, by which it will appear, how providentially the Creator has furnished every animal with such cloathing, as is proper for the countrey where they live, and also how excellently the structure of their bodies is adapted to their particular way of life; so that they seem to be destined solely to the places, where they are found.

Monkeys, elephants, and rhinoceroses feed upon vegetables, that grow in hot countries, and therefore therein they have their allotted places. When the sun darts forth its most fervid rays, these animals are of such a nature, and disposition, that it does them no manner of hurt; nay with the rest of the inhabitants of those parts they go naked, whereas were they

they covered with hairy skins they must perish with heat.

On the contrary the place of *rhen deer* is fixed in the coldest part of Lapland, because their chief food is the *liverwort*, Fl. 980. which grows no where so abundantly as there; and where, as the cold is most intense, the *rhen deer* are cloathed, like the other northern animals, with skins filled with the densest hair; by the help of which they easily defy the keenness of the winter. In like manner the *rough-legged partridge* passes its life in the very Lapland alps, feeding upon the seeds of the *dwarf birch*, and that they may run up and down safely amidst the snow, their feet are feathered.

The *camel* frequents the sandy, and burning deserts, in order to get the barren *camel's bay*. Mat. Med. 31. How wisely has the Creator contrived for him! he is obliged to go thro' the deserts, where oftentimes no water is found for many miles about. All other animals would perish with thirst in such a journey; but the camel can undergo it without suffering; for his belly is full of cells, where he reserves water for many days. It is reported by travellers, that the Arabians, when in travelling they want water, are forced to kill their camels; and take

water out of their bellies, that is perfectly good to drink, and not at all corrupted.

The *pelican* likewise lives in desert, and dry places; and is obliged to build her nest far from the sea, in order to procure a greater share of heat to her eggs. She is therefore forced to bring water from afar for herself and her young; for which reason Providence has furnished her with an instrument most adapted to this purpose; v. g. she has a very large bag under her throat, which she fills with a quantity of water sufficient for many days; and this she pours into the nest to refresh her young, and teach them to swim. The wild beasts, lions, and tigers, come to this nest to quench their thirst, but do no hurt to the young.

Oxen delight in low grounds, because there the food most palatable to them grows.

Sheep prefer naked hills, where they find a particular kind of grass called the *festuca*, Fl. 95. which they love above all things.

Goats climb up the precipices of mountains, that they may browse on the tender shrubs, and in order to fit them for it, they have feet made for jumping*.

* Vid. Derham's Physico-Theol. p. 319. not 7.

Horses chiefly resort to woods, and feed upon leafy plants.

Nay, so various is the appetite of animals, that there is scarcely any plant, which is not chosen by some, and left untouched by others. The *horse* gives up the *water hemlock* to the goat. The *cow* gives up the *long-leaved water hemlock* to the sheep. The *goat* gives up the *monks-hood* to the horse, &c. for that which certain animals grow fat upon, others abhor as poison. Hence no plant is absolutely poisonous, but only respectively. Thus the *spurge*, that is noxious to man, is a most wholesome nourishment to the *caterpillar*, Fn. 825. That animals may not destroy themselves for want of knowing this law, each of them is guarded by such a delicacy of taste and smell, that they can easily distinguish what is pernicious from what is wholesome; and when it happens that different animals live upon the same plants, still one kind always leaves something for the other, as the mouths of all are not equally adapted to lay hold of the grass; by which means there is sufficient food for all. To this may be referred an æconomical experiment well known to the Dutch, that when eight cows have been in a pasture, and can no

longer get nourishment, two horses will do very well there for some days, and when nothing is left for the horses, four sheep will live upon it.

Swine get provision by turning up the earth; for there they find the succulent roots, which to them are very delicious.

The leaves and fruits of trees are intended as food for some animals, as the sloth^f,
the

^f There is so curious an account of this animal in Kircher's *Musurgia*, that i think the reader will excuse my transcribing it. That author says thus : ' The description of
' this animal i had from father Torus, provincial of the Jesuites
' in America, who had animals of this kind in his possession,
' and made many experiments in relation to their nature
' and qualities. Its figure is extraordinary ; it is about the
' bigness of a cat, of very ugly countenance, and has claws
' extended like fingers. The hinder part of the head and
' neck are covered with hair. It sweeps the ground with
' its fat belly, never rises upon its feet, and moves so
' slowly, that it would scarce go the length of a bow-shot
' in 15 days, tho' constantly moving, and it is therefore
' called the Sloth. It is not known what it feeds upon,
' not being ever observed to take any food. It lives gene-
' rally upon tops of trees, and employs two days to crawl
' up, and as many to get down again. Nature has doubly
' guarded this animal against its enemies. First by giving
' it such strength in its feet that whatever it seizes, it holds
' so fast, that it never can be freed from its claws, but must
' there dye of hunger. Secondly in giving it such a moving
' aspect,

the squirrel, and these last have feet given them fit for climbing.

Besides myriads of fishes, the *castor*, the *sea calf*, and others inhabit the water, that they may there be fed, and their hinder feet are fit for

‘ aspect, when it looks at any man who should be tempted
 ‘ to hurt it, that it is impossible not to be touched with
 ‘ compassion ; besides that at the same time it sheds tears,
 ‘ and upon the whole persuades one, that a creature so defenceless, and of so unhappy a body ought not to be tormented. To make an experiment of this, the above-mentioned father procured one of these animals to be brought to our college at Carthagen. He put a long pole under his feet, which it seized upon very firmly, and would not let it go again. The animal therefore thus voluntarily suspended was placed between two beams along with the pole, and there it remained without meat, drink, or sleep, forty days ; its eyes being always fixed on people that looked at it, who were so touched, that they could not forbear pitying it. At last being taken down they let loose a dog on it, which after a little while the Sloth seized with his feet, and held him four days, till he dyed of hunger. This was taken from the mouth of the father. They add, continues Kircher, that this creature makes no noise but at night, but that very extraordinary. For by interruptions, that last about the length of a sigh or semipause it goes thro’ the six vulgar intervals of music ut, re, mi, fa, sol, la. La, sol, fa, mi, re, ut, ascending and descending, and these perfectly in tune. So that the Spaniards, when they first got possession of this coast, and heard these

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‘ notes,

for swimming, and perfectly adapted to their manner of life.

The whole order of the *goose* kind, as ducks, merganser, &c. pass their lives in water as feeding upon water-insects, fishes, and their eggs^s. Who does not see, that attends ever so little, how exactly the wonderfull for-

‘ notes, they imagined that some people brought up to our
‘ music, were singing. This animal is called by the na-
‘ tives Haut, certainly because going thro’ these musical
‘ intervals, it repeats, Ha, ha, ha, ha, &c.

This account seems very wonderfull, and i leave it as it stands without entering into any discussion about its credibility. I will only add, that Linnæus seems in the new edition of the Syst. Nat. to give credit to it. For he says in his short way of description among other things, ‘ It utters
‘ an ascending hexacord. Its noise is horrible, its tears piteous.’ He quotes Mangrave, Clusius, Gefner, &c. But not having an opportunity of consulting these books i cannot tell how far these authors confirm the foregoing account; if it be true, it would furnish some observations, but this would not be a place for them.

^s Many opinions, says the author in the note, have been started in order to account how it happens that fishes are found in pools, and ditches, on high mountains and elsewhere. But Gmelin observes that the *duck* kind swallow the eggs of fishes, that some of these eggs go down, and come out of their bodies unhurt, and so are propagated just in the same manner, as has been observed of plants. Biberg.

Gmelin adds, that the Sibirians themselves account for this phenomenon in the manner above mentioned.

mation

mation of their beaks, their necks, their feet, and their feathers suit their kind of life, which observation ought to be extended to all other birds.

The way of living of the *sea-swallow* Fn. 129. deserves to be particularly taken notice of; for as he cannot so commodiously plunge into the water and catch fish, as other aquatic birds, the Creator has appointed the *sea-gull* to be his caterer in the following manner. When this last is pursued by the former, he is forced to throw up part of his prey, which the other catches; but in the autumn, when the fishes hide themselves in deep places, the merganser, Fn. 113. supplies the gull with food, as being able to plunge deeper into the sea. Act. Stock.

The chief granary of *small birds* is the *knot-grass*, Fol. Suec. 322. that bears heavy feeds, like those of the *black bindweed*. It is a very common plant, not easily destroyed, either by the road side by trampling upon it, or any where else, and is extremely plentiful after harvest in fields, to which it gives a reddish hue by its numerous feeds. These fall upon the ground, and are gathered all the year round by the small birds,

^h Thus bountifull nature feeds the fowls of the air.

The Creator has taken no less care of some *amphibious animals*, as the snake and frog kind, which, as they have neither wings to fly, nor feet to run swiftly, and commodiously, would scarcely have any means of taking their prey, were it not that some animals run, as it were of their own accord, into their mouths. When the *rattle-snake* a native of America, with open jaws fixes his eyes on a bird, fly, or squirrel, sitting on a tree, they fly down his throat, being rendered stupid, and giving themselves upⁱ, as destitute of all refuge. On the other hand we cannot but adore the Creator's great goodness towards man, when we

^h To which we may add, that many small birds feed upon the seeds of *plantain*, particularly linnets. It is generally known that the goldfinch lives upon the seed of *thistles*, from which he has its name in Greek, Latin and French.

ⁱ How dreadfull this serpent is to other animals will appear by an account we have in a treatise intituled, *Radix Senega*. Where the author Amæn. academ. vol. 2. says, one of these terrible serpents got clandestinely into the house of governor Blake at Cacolina; where it would have long laid concealed, had it not been that all the domestic animals, as dogs, hogs, turkies and fowls admonished the family by their unusual cries, equally shewing their horror and consternation, their hair, bristles and crests standing up an end.

consider

consider the rattle which terminates this serpent's tail. For by the means of that we have an opportunity of guarding against this dreadful enemy; the sound warning us to fly, which if we were not to do, and we should be wounded by him, the whole body would be turned into a putrid corruption in six hours, nay sometimes in half an hour.

The limits of this dissertation will not permit me to produce more examples of this kind. But whoever will be at the pains to take ever so slight a view of the wonderful works of the Creator, will readily see, how wisely the plan, order and fitness of things to divine ends are disposed.

§. 16.

We cannot without the utmost admiration behold how providently the Creator has acted as to the preservation of those animals, which at a certain time of the year, are by the rigor of the season excluded from the necessaries of life. Thus the *bear* in the autumn creeps into the *moss*, which he has gathered, and there lies all winter; subsisting upon no other nourishment but his fat, collected during the summer in the cellulous membrane, and which
without

without doubt, during his fast, circulates thro' his vessels, and supplies the place of food; to which perhaps is added that fat juice which he sucks out of the bottom of his feet.

The *bedge-bog*, *badger* and *mole* in the same manner fill their winter quarters with vegetables, and sleep during the frosts.

The *bat* seems cold, and quite dead all the winter. Most of the *amphibious animals* get into dens, or to the bottom of lakes and pools.

In the autumn, as the cold approaches, and insects disappear, *swallows* * seek for an asylum against the violence of the cold in the bottom
of

* I never had but one credible testimony that swallows pass the winter at the bottom of lakes or ponds; and this from a gentleman of character, who saw a swallow so found brought to life by warmth. On the other hand, I know of no author but Herodotus who mentions their being seen in any country during the winter. He lib. 2. p. 109. edit. Steph. says, that swallows and kites continue all the year about the springs of the Nile. What he mentions concerning kites deserves some notice, viz. that they lye concealed in holes a few days. Pliny says a few months. Gesner repeats the same, adding that they have been found in hollow trees somewhere in Upper Germany, but he seems to relate this upon hearsay only. Aldrovandus gives the same account as Gesner, and adds that they winter in Ægypt, but whether upon the authority of Bellonius or any other credible writer, does not appear.

of lakes amongst the reeds and rushes; from whence by the wonderfull appointment of nature they come forth again. The peristaltic motion of the bowels ceases in all these animals, while they are obliged to fast, whence the appetite is diminished, and so they suffer less from hunger. To this head may be referred the observation of the celebrated Lister concerning those animals; that their blood, when let into a bason, does not coagulate, as that of all other animals, and so is no less fit for circulation than before.

The *moor-fowls* work themselves out walks under the very snow. They moult in the summer, so that about the month of August they

appear. He quotes a passage from that author concerning the appearance of a vast number of kites at the mouth of the Bosphorus, but this happened at the latter end of May, and seems to prove nothing; for the time marked for their appearance by Calippus, who observed near the Hellespont, is the month of March. Willughby says that kites are supposed to be birds of passage, and then quotes from Bello-nius the place abovementioned.

From what has been said it appears evident, that nothing certain is known by the moderns about the disappearance of these remarkable birds, yet their coming was regularly noted by the antient writers, and coincided with that of swallows, as appears by the old calendars of Geminus, and Ptolemy from the observations of Eudoxus, Euctemous, Calippus, and Dositheus.

cannot fly, and are therefore obliged to run into the woods ; but then the moor-berries and bilberries are ripe, from whence they are abundantly supplied with food. Whereas the young do not moult the first summer, and therefore, tho' they cannot run so well, are able to escape danger by flight.

The *rest of the birds* who feed upon insects migrate every year to forreign regions, in order to seek for food in a milder climate; while all the northern parts, where they live well in the summer, are covered with snow.

Insects in the winter generally lye hid within their cases, and are nourished by the surrounding liquor like the fœtus of other animals, from whence at the approach of spring they awake, and fly forth to the astonishment of every one.

However all animals which lye hid in winter, do not observe these laws of fasting. Some provide store-houses in summer, and autumn, from which they take what is necessary, as *mice, jays, squirrels, bees.*

§. 17.

What i have observed in a few words concerning the migration of birds into forreign coun-

countries, gives me an opportunity of illustrating this subject farther by instances.

The *starling*, Fn. 183. finding with us after the middle of summer worms in less plenty, yearly goes into Schonen, Germany and Denmark.

The *female chaffinches* every winter about Michaelmas go in flocks to Holland; but as the males stay with us, they come back the next spring, unless such as choose to breed no more.

In the same manner the female *Caroline yellow-hammer* in the month of September, while the rice, on which she feeds, is laid up in granaries, goes towards the south, and returns in the spring to seek her mate.

Our *aquatic birds* are forced by necessity to fly towards the south every autumn before the water is frozen. Thus we know that the lakes of Poland and Lithuania are filled with *swans* and *geese* every autumn, at which time they go in great flocks along many rivers as far as the Euxine. But in the beginning of spring, as soon as the heat of the sun molests them, they turn back, and go again to the northern pools, and lakes, in order to lay their eggs. For there, and especially in Lapland, there is a vast abundance of knats Fn. 1116. which afford them
excellent

excellent nourishment, as all of this kind live in the water, before they get their wings.

The *woodcock* Fn. 141. lives in England in winter, and departs from thence at the coming on of spring after they have paired.

The *swallow-tail'd sheldrake* Fn. 96. crosses Sweden in April, and does not stop till she has reached the White sea.

The *coblers awl* Fn. 137. goes every autumn into Italy.

The *arctic driver* Fn. 121. goes into Germany every spring, and autumn.

The *missel thrush* Fn. 189. fills our woods in the spring, but leaves us in the winter.

The *pied chaffinch* Sys. Nat. 10. 97. 1. during the winter, being obliged to leave the alps *, hastens into Sweden, and often into Germany.

The *gulls* visit Spain and Italy.

The *raven* ¹ goes into Schonen.

By these migrations birds also become useful to many different countries, and are distributed over almost all the globe. I cannot forbear expressing my admiration here, that all

* The Author means the Northern alps.

¹ I have translated the word *corvus* by raven, because Linnæus does not mention the carrion crow at all, either in the Faun. Succ. nor in the Syst. Nat. before the late edition.

of them exactly observe the times of coming and going, and that they do not mistake their way.

There is a very large shell-fish in the Mediterranean called the *pinna*, blind as all of that genus, but furnished with very strong calcareous valves. (Bell. aquat. 401. t. 401. Jonst. exsang. t. 16. f. 5, 6. Gualt. ind. t. 79, 79.) The *scuttle-fish* (Bell. aquat. 330. t. 331. Jonst. exsang. t. 1. f. 1.) is an inhabitant of the same sea, and a deadly enemy to the former; as soon as the *scuttle-fish* sees the *pinna* open its shell, he rushes upon her like a lion, and devours her. The *pinnoterres* or *pinnophylax* (Jonst. exsang. t. 20. f. 3.) is of the crab kind naked, like the hermit, and very quick-sighted. This *cancer* or *crab* the *pinna* receives into her covering, and when she opens her valves in quest of food, lets him out to look for prey. During this the *scuttle-fish* approaches; the *crab* returns with the utmost speed and anxiety to his hostess, who being thus warned of the danger shuts her doors, and keeps out the enemy. That very sagacious observer D. D. Hasselquist in his voyage towards Palestine beheld this curious phænomenon, which tho' well known to the antients had escaped the moderns. Arist. hist. lib. 5. c. 15. relates, that

that the *pinna* kept a guard to watch for her. That there grew to the mouth of the *pinna* a small animal, having claws, and serving as a caterer, which was like a *crab*, and was called the *pinnophylax*. Plin. lib. 9. 51. says, the smallest of all the kinds is called the *pinnoteres*, and therefore liable to injury; this has the prudence to hide itself in the shells of *oysters*. Again lib. 9. 66. he says ^m the *pinna* is of the genus of shell-fish; it is produced in muddy waters, always erect, nor ever without a companion, which some call the *pinnoteres*, others the *pinnophylax*. This sometimes is a small *squill*, sometimes a *crab*, that follows the *pinna* for the sake of food. The *pinna* is blind, and

^m This is taken out of Aristotle, who seems to have thought, that the *pinna* grew from that which really is its beard, and which it throws out upon the adjoining bodies in order to fix itself. For he says the *pinna* is produced from the *byssus*, which is generally supposed to mean the beard of this shell-fish, and to have been used for making the finest of stuffs, frequently mentioned by antient writers under the name of *Byssine* garments, and of which they now in some countries make stockings as I am informed. This notion of the *pinna* growing from the *byssus* or beard is of the same kind with that which prevailed formerly in relation to the goose tree, mentioned by many writers, of whom a long list may be seen in the tenth edition of the *Syst. Nat.*

when upon opening its shell it exposes itself as a prey to the smallest kind of fishes, these immediately assault her, and growing bolder upon finding no resistance venture in. The guard watching its time gives notice by a bite; upon which the *pinna* closing its shell, shuts in, kills, and gives part of whatever happens to be there to its companion.

The *pinna*, and the *crab* together dwell,
For mutual succour in one common shell.
They both to gain a livelihood combine;
That takes the prey, when this has given the sign.
From hence this *crab* above his fellows famed,
By antient Greeks was *pinnoteres* named.

OPPIAN.

§. 18.

Destruction.

We have observed above that all animals do not live upon vegetables, but that there are some which feed upon certain animalcula. Nay there are some which subsist only by rapine, and daily destroy numbers of the peaceable kind.

These animals are destroyed, but in such a

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manner

manner that the weaker generally are infested by the stronger in a continued series. Thus the *tree-louse* lives upon plants. The fly called *musca aphidivora* lives upon the *tree-louse*. The *hornet* and *wasp* fly upon the *musca aphidivora*. The *dragon fly* upon the *hornet* and *wasp* fly. The *spider* on the *dragon fly*. The *small birds* on the *spider*. And lastly the *hawk* kind on the *small birds*.

In like manner the ⁿ *monoculus* delights in putrid waters, the *knat* eats the *monoculus*, the *frog* eats the *knat*, the *pike* eats the *frog*, the *sea calf* eats the *pike*.

The *bat* and *goat-sucker* make their excursions only at night, that they may catch the *moths* which at that time fly about in vast quantities.

The *wood-pecker* pulls out the *insects*, which lye hid in the trunks of trees.

The *swallow* pursues those which fly about in the open air.

The *mole* pursues the *worms*. The large fishes devour the small. Nay we scarcely know an animal, which has not some enemy to contend with.

ⁿ An insect that has no name in English as far as i can find.

Amongst quadrupeds *wild beasts* are most remarkably pernicious and dangerous to others, as the *hawk* kind among birds. But that they may not, by too atrocious a butchery, destroy whole species; even these are circumscribed within certain bounds, First, as to the most fierce of all, it deserves to be noted how few they are in proportion to other animals. Secondly, the number of them is not equal in all countries. Thus France and England breed no *wolves*, and the northern countries no *tigers* or *lions*. Thirdly, these fierce animals sometimes fall upon, and destroy one another. Thus the *wolf* devours the *fox*. The *dog* infests both the *wolf* and *fox*; nay *wolves* in a body will sometimes venture to surround a *bear*. The *tiger* often kills its own male whelps. *Dogs* are sometimes seized with madness and destroy their fellows, or with the mange destroy themselves.

Lastly, wild beasts seldom arrive at so great an age as animals, which live on vegetables. For they are subject from their alkaline diet to various diseases, which bring them sooner to an end.

But although all animals are infested by their peculiar enemies, yet they are often able to

elude their violence by stratagems and force. Thus the *bare* often confounds the dog by her windings.

When the *bear* attacks *sheep* and cattle, they draw up together for mutual defence. *Horses* joyn heads together, and fight with their heels. *Oxen* joyn tails, and fight with their horns.

Swine get together in herds, and boldly oppose themselves to any attack, so that they are not easily overcome; and it is worth while to observe, that all of them place their young, as less able to defend themselves, in the middle, that they may remain safe during the battle.

Birds by their different ways of flying oftentimes escape the *hawk*. If the *pigeon* had the same way of flying as the *hawk* she would hardly ever escape his claws°.

It deserves also to be remarked, how much some animals consult their safety by night. When *horses* sleep in woods, one by turns remains awake, and, as it were, keeps watch. When *monkies*, S. N. 2. 10. in Brasil sleep
upon

° As i have, when opportunities offered, measured and weighed several kinds of birds, i shall here subjoyn a table of some of them with the proportions of the weight to the sail. N. B. By sail i mean the extent of the wings and tail.

I do

upon trees, one of them keeps awake, in order to give the sign, when the *tiger* creeps towards them,

I do not pretend to accuracy, and i imagine it will not be expected on a subject of this nature.

		Weight		Proportion of square inches to the ounce.
		Avoirdupois.		
		l.	oz.	
Turkey	----	8	8	$2\frac{1}{4}$
Pheasant	----	2	8	$2\frac{1}{4}$
Coot	----	2	8	$2\frac{1}{4}$
Black cock	----	2	6	$3\frac{1}{2}$
Puttock	----	1	14	18
Rook	----	1	3	$10\frac{1}{4}$
Partridge	----	1	1	3
Ivy owl	----	0	15	9
Ring-dove	----	0	14	10
Woodcock	----	0	10	6
Small hawk	---	0	$6\frac{3}{4}$	26
Wood-pecker	---	0	4	9
Cuckow	----	0	4	18
Missel bird	----	0	4	14
Snipe	----	0	4	$9\frac{1}{4}$
Redshank	----	0	4	9
Cross bill	----	0	$1\frac{1}{2}$	$11\frac{3}{4}$
House swallow	---	0	1	18
House sparrow	---	0	1	12
Wheat-ear	----	0	1	14
Linnet	----	0	$0\frac{1}{2}$	$20\frac{3}{4}$
Black cap	----	0	$0\frac{1}{2}$	18
Stone smich	----	0	$0\frac{1}{2}$	25
Beccasigo	----	0	$0\frac{1}{2}$	24
White throat	---	0	$0\frac{1}{2}$	17
		grains.		
Long tailed titmouse	o	95		25
Regulus cristatus	o	76		23

them, and in case the guard should be caught asleep, the rest tear him to pieces*. Hence the hunting of rapacious animals is not always successful, and they are often obliged to labor for a whole day to no purpose. For this reason the Creator has given them such a nature, that they can bear fasting a long time. Thus the *lion* lurks in his den many days without famishing, and the *wolf*, when he has once well satisfied his hunger, can fast many weeks without any difficulty.

It appears by this table that the smaller birds in general have more sail in proportion than the larger of the esculent kind, such as the pheasant, partridge, woodcock, ring-dove, &c. and that it should be so contrived appears reasonable on more accounts than one. First, because small birds living, many of them, amongst shrubs and bushes, are obliged to make short and quick motions in hopping from bough to bough, at which time they always make use of their wings; some of them live chiefly on worms and flies, which are not to be caught without great nimbleness, and frequent gardens and houses and are more liable to the attacks of cats and other animals. And those which live in the open fields are exposed to the hawk, and were they not quick at turning they would scarcely ever escape.

Again the different proportions of the bulk to the surface in large and small birds is to the disadvantage of the latter, on account of the greater proportional resistance of the air, and this wanted some compensation.

More might be added on this subject, but i am afraid most readers will think what i have already said is more than enough.

* Maregraf. Bras. 227. Biberg.

If we consider the end for which it pleased the Supreme Being to constitute such an order of nature, that some animals should be, as it were, created only to be miserably butchered by others, it seems that his Providence not only aimed at sustaining, but also keeping a just proportion amongst all the species; and so prevent any one of them increasing too much, to the detriment of men, and other animals. For if it be true, as it is most assuredly, that the surface of the earth can support only a certain number of inhabitants, they must all perish, if the same number were doubled, or tripled, Derh. Phys. Theol. p. 237.

There are some viviparous *flies*, which bring forth 2000 young. These in a little time would fill the air, and like clouds intercept the rays of the sun, unless they were devoured by birds, spiders, and many other animals.

Storks, and *falcons* free Ægypt from *frogs*, which after the inundation of the Nile, cover all the countrey. The same birds also clear Palestine of *mice*. Bellonius on this subject says as follows. “The *storks* come to Ægypt
“in such abundance, that the fields, and mea-
“dows are white with them. Yet the Ægypt-
“tians are not displeased with this sight; as

* Muschenbr.

“ *frogs* are generated in such numbers there,
 “ that did not the *storks* devour them, they
 “ would over-run every thing. Besides they
 “ also catch, and eat *serpents*. Between Belba
 “ and Gaza the fields of Palestine are often
 “ desert on account of the abundance of *mice*,
 “ and *rats*; and were they not destroyed by the
 “ *falcons*, that come here, by instinct, the in-
 “ habitants could have no harvest.

The *white fox* S. N. 8. 7. is of equal advantage
 in the Lapland alps; as he destroys the Norway
rats, F. N. 26. which are generated there in great
 abundance; and thus hinders them from in-
 creasing too much in proportion, which would
 be the destruction of vegetables.

It is sufficient for us, that nothing is made
 by Providence in vain, and that whatever is
 made, is made with supreme wisdom. For it
 does not become us to pry too boldly into all the
 designs of God. Let us not imagine, when
 these rapacious animals sometimes do us mis-
 chief, that the Creator planned the order of na-
 ture according to our private principles of œco-
 nomy; for the Laplanders have one way of
 living; the European husbandman another;
 the Hottentots and savages a third, whereas
 the stupendous œconomy of the Deity is one
 through-

throughout the globe, and if Providence does not always calculate exactly according to our way of reckoning, we ought to consider this affair in the same light, as when different seamen wait for a fair wind, every one, with respect to the part he is bound to, who we plainly see cannot all be satisfied.

§. 19.

The whole earth would be overwhelmed with carcases, and stinking bodies, if some animals did not delight to feed upon them. Therefore when an animal dyes, *bears, wolves, foxes, ravens*, &c. do not lose a moment till they have taken all away. But if a *horse* e. g. dyes near the public road, you will find him, after a few days, swoln, burst, and at last filled with innumerable *grubs* of carnivorous *flies*, by which he is entirely consumed, and removed out of the way, that he may not become a nuisance to passengers by his poisonous stench.

When the carcases of fishes are driven upon the shore, the voracious kinds, such as the *thorn-back*, the *hound fish*, the *conger eel*, &c. gather about and eat them. But because the flux, and
reflux

reflux soon change the state of the sea, they themselves are often detained in pits, and become a prey to the wild beasts, that frequent the shores. Thus the earth is not only kept clean from the putrefaction of carcases, but at the same time by the œconomy of nature the necessaries of life are provided for many animals. In the like manner many *insects* at once promote their own good, and that of other animals. Thus *knats* lay their eggs in stagnant, putrid and stinking waters, and the *grubs* that arise from these eggs clear away all the putrefaction; and this will easily appear, if any one will make the experiment by filling two vessels with putrid water, leaving the *grubs* in one, and taking them all out of the other. For then he will soon find the water, that is full of *grubs*, pure and without any stench, while the water that has no *grubs* will continue stinking.

Lice increase in a wonderfull manner in the heads of children, that are scabby, nor are they without their use, for they consume the redundant humours.

The *beetle* kind in summer extract all moist and glutinous matter out of the dung of cattle,

so that it becomes like dust, and is spread by the wind over the ground. Were it not for this, the vegetables that lye under the dung, would be so far from thriving, that all that spot would be rendered barren.

As the excrements of *dogs* is of so filthy and septic a nature, that no *insect* will touch them, and therefore they cannot be dispersed by that means, care is taken that these animals should exonerate upon stones, trunks of trees, or some high place, that vegetables may not be hurt by them.

Cats bury their dung. Nothing is so mean, nothing so little, in which the wonderfull order, and wise disposition of nature does not shine forth.

§. 20.

Lastly, all these treasures of nature so artfully contrived, so wonderfully propagated, so providentially supported throughout her three kingdoms, seem intended by the Creator for the sake of man. Every thing may be made subservient to his use, if not immediately, yet mediately, not so to that of other animals. By the help of reason man tames the fiercest animals,

mals, pursues and catches the swiftest, nay he is able to reach even those, which lye hid in the bottom of the sea.

By the help of reason he increases the number of vegetables immensely, and does that by art, which nature, left to herself, could scarcely effect. By ingenuity he obtains from vegetables whatever is convenient or necessary for food, drink, cloathing, medicine, navigation, and a thousand other purposes.

He has found the means of going down into the abyfs of the earth, and almost searching its very bowels. With what artifice has he learned to get fragments from the most rocky mountains, to make the hardest stones fluid like water; to separate the usefull metal from the useles dross, and to turn the finest sand to some use! In short when we follow the series of created things, and consider how providentially one is made for the sake of another, the matter comes to this, that all things are made for the sake of man; and for this end more especially, that he by admiring the works of the Creator should extoll his glory, and at once enjoy all those things, of which he stands in need, in order to pass his life conveniently and pleasantly.

§. 21.

This subject concerning the œconomy of nature, a very small part of which i have lightly touched upon, is of such importance and dignity, that if it were to be properly treated in all its parts, men would find wherewithal to employ almost all the powers of the mind. Nay time itself would fail before even the most acute human sagacity would be able to discover the amazing œconomy, laws, and exquisite structure of the least insect, since as Pliny observes, nature no where appears more herself, than in her most minute works. Every species of created beings deserves to engross one examiner.

If according to gross calculation we reckon in the world 20000 species of *vegetables*, 3000 of *worms*, 12000 of *insects*, 200 of *amphibious animals*, 2600 of *fishes*, 2000 of *birds* ^p, 200 of *quadrupeds*; the whole sum of the species of living creatures will amount to 40000. Out of these our countrey has scarcely 3000,

^p How the author came to reckon 2000 species of birds in the world i cannot guess, for in the Syft. Nat. Linn. edit. 6. there are only about 150 mentioned, and in the last edition of that book not above 550.

for we have discovered only about 1200 native plants, and about 1400 species of animals. We of the human race, who were created to praise and adore our Creator, unless we choose to be mere idle spectators, should and in duty ought to be affected with nothing so much as the pious consideration of this glorious palace. Most certainly if we were to improve and polish our minds by the knowledge of these things; we should besides the great use which would accrue to our œconomy, discover the more excellent œconomy of nature, and more strongly admire it when discovered.

Omnium elementorum alterni recurſi ſunt,
Quicquid alteri perit in alterum tranſit.

Senec. Nat. III. 10.

THE foregoing piece, though on a subject often treated by learned and ingenious men, seems to me to contain many things new and curious, and to give a more comprehensive and distinct view, as it were in a map, of the several parts of nature, their connections and dependencies, than is any where else to be found. But exclusive of this or any other comparative merit, it certainly conveys an usefull

lesson, and such an one as the best of us often want to have inculcated.

From a partial consideration of things, we are very apt to criticise what we ought to admire ; to look upon as useless what perhaps we should own to be of infinite advantage to us, did we see a little farther ; to be peevish where we ought to give thanks ; and at the same time to ridicule those, who employ their time and thoughts in examining what we were, i. e. some of us most assuredly were, created and appointed to study. In short we are too apt to treat the Almighty worse than a rational man would treat a good mechanic ; whose works he would either thoroughly examine, or be ashamed to find any fault with them. This is the effect of a partial consideration of nature ; but he who has candor of mind and leisure to look farther, will be inclined to cry out :

How wond'rous is this scene ! where all is form'd
With number, weight, and measure ! all design'd
For some great end ! where not alone the plant
Of stately growth ; the herb of glorious hue,
Or food-full substance ; not the laboring steed,
The herd, and flock that feed us ; not the mine
That yields us stores for elegance, and use ;

The

The sea that loads our table, and conveys
The wanderer man from clime to clime, with all
Those rolling spheres, that from on high shed
down.

Their kindly influence; not these alone,
Which strike ev'n eyes incurious, but each moss,
Each shell, each crawling insect holds a rank
Important in the plan of Him, who fram'd
This scale of beings; holds a rank, which lost
Wou'd break the chain, and leave behind a gap
Which nature's self would rue. Almighty Being,
Cause and support of all things, can i view
These objects of my wonder; can i feel
These fine sensations, and not think of thee?
Thou who dost thro' th' eternal round of time;
Dost thro' th' immensity of space exist
Alone, shalt thou alone excluded be
From this thy universe? Shall feeble man
Think it beneath his proud philosophy
To call for thy assistance, and pretend
To frame a world, who cannot frame a clod?—
Not to know thee, is not to know ourselves—
Is to know nothing—nothing worth the care
Of man's exalted spirit—all becomes
Without thy ray divine, one dreary gloom;
WHERE lurk the monsters of phantastic brains,
Order bereft of thought, uncus'd effects,

Fate

Fate freely acting, and unerring Chance.

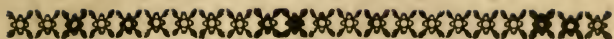
WHERE meanless matter to a chaos sinks
Or something lower still, for without thee
It crumbles into atoms void of force,

Void of resistance — it eludes our thought.

WHERE laws eternal to the varying code
Of self-love dwindle. Interest, passion, whim
Take place of right, and wrong, the golden chain
Of beings melts away, and the mind's eye
Sees nothing but the present. All beyond
Is visionary guess — is dream — is death.

ON THE
FOLIATION of TREES.





ON THE
FOLIATION of TREES;
OR,

The time when they put out their
leaves.

By *HARALD BARCK*.

UPSAL, 1753. May 3.

Amæn. Acad. vol. iii.

§. I.

BOtanists in every age have not only taken great pains to discover and give names to plants, but have also described them with all possible accuracy. But this part of knowledge has been, till this present age, confined to narrower bounds than it deserved; for an opinion has prevailed amongst almost all the men of learning, that it is of no use out of the re-

gions of medicine. From whence it has happened, that we find very few that have cultivated botany, but physicians; nor have even these carried their inquiries farther than to obtain a moderate knowledge of officinal plants. But in our times some, who are worthy of the highest regard from all true lovers of this study, have endeavoured to find out, and investigate the vertues of plants with greater care, and industry. For these men besides medical uses have discovered great, and remarkable advantages accruing from such researches.

However i do not intend to give a catalogue of them here, but shall content myself with just touching upon some few things, that have been done in this way, in our own university. In the *Philosophia Botanica* our illustrious president has shewn, that every soil has its own peculiar plants, which we should seek for in vain any where else; and that certain plants keep, as it were, their watches, i. e. expand their flowers and close them again at stated times^a. The dissertation on the *expansions of plants* has imparted to the learned world the use of various phænomena, which

^a Vid. Philos. Botan. p. 263. 273. Barek. This curious subject is amply treated in Amæn. Acad. vol. 4.

occur in the fœcundation of plants. The *Flora æconomica* has faithfully set forth the use of plants in private life. The dissertation on the *buds of plants* has opened to us the cause, why various trees cannot bear the snows, and frosts of our part of the world. From the essay on the *esculent plants* of our countrey we find, that there are many plants growing with us, which are proper for food, hitherto overlooked. In the *Swedish Pan* it is shewn, that certain plants only are destined for sustenance to certain animals. From the *Hospita Insectorum Flora* we are informed that certain vegetables are eat by certain species of insects.

It is now the fourth year since our illustrious president exhorted his countreymen to observe with all care and diligence, at what time every tree expands its buds, and unfolds its leaves; imagining, and not without good reason, that our countrey would some time or other, from observations of this kind made in different places, reap some new, and perhaps unexpected advantage. Upon this admonition, i at that time living in Smoland with that noble person G. A. Witting major, and knight of the military order, was incited to observe for the space of three years, beginning from the year

1750, the days when different trees began to put out their leaves, when the countreymen sowed their fields, and how much time there passed between seed time, and harvest. This i did with intent, if possible, to find out fixed laws by which to regulate the proper seed-time in every province. But the few observations, which i was able to make, were not sufficient for this purpose ; that the work therefore which i meditated might not rest upon too flight a foundation, our president communicated all the papers sent to him from different places for my examination. Such then is the design of this essay, and i submit it to the candid reader, hoping that he will look upon it with an indulgent eye.

§. 2.

Our lands, which lye under a cold sky, are bound up with frost all the winter. Hence the roots of our plants oppressed, as it were, with a drowsy sleep, are benumbed, and many herbs, that remain above ground, dye^r. But
when

^r We have had five winters remarkably severe in Sweden, viz. 1665, $\frac{1683}{1684}$, $\frac{1708}{1709}$, $\frac{1739}{1740}$, and 1751. The cold of which last Feb. 1. N S. was extremely intense, and such as
has

when the sun by its mild rays at the beginning of spring refreshes the earth, the snows melt, the

has scarcely been known in this age, for the botanic thermometer sunk to 32 degrees. Barck.

In that thermometer the freezing point is 0, and that of boiling water 100. So that taking it for granted that the author must mean 32 below 0, this point would answer to 57 below 32 or the freezing point of Farenheit, which is a degree of cold never known in this countrey. I am assured from good authority, that in the year 1739 the thermometer did not sink nine degrees below freezing point in England. They who are curious to see much more surprizing instances of cold than that in Sweden, may consult the preface to Gmelin's *Flora Sibirica*, where they will find how very apt philosophers are to fall into mistakes about the powers of nature, when they trust to theory, instead of consulting experience. Monf. Maupertuis says, that the mercury in Reaumur's thermometer in Lapland sunk to 37 degrees below freezing point, which is equal to 67 degrees in Farenheit.

Perhaps, says Linnæus in the *Flora Lapponica*, the curious reader will wonder how the people in Lapland during the terrible cold, that reigns there in winter, can preserve their lives; since almost all birds, and even some wild beasts, desert it at that time. The Laplander not only in the day, but thro' whole winter nights is obliged to wander about in the woods with his herds of rein deer. For the rein deer never come under cover, nor eat any kind of fodder, but a particular kind of *liverwort*. On this account the herdsmen are under a necessity of living continually in the woods, in order to take care of their cattle, lest they should be devoured by wild beasts. The

Lap-

the ice gives way, the frost is dissolved, and a joyfull face of things returns. Immediately we see

Laplander easily does without more light, as the snow reflects the rays that come from the stars, and as the *aurora borealis* illuminates the air every night with a great variety of figures. The cold is so great that foreigners are kept aloof, and even deterred from their most happy woods. No part of our body is more easily destroyed by cold than the extremities of the limbs, which are most remote from the sun of this microcosm, the heart. The kibes that happen to our hands, and feet, so common in the northern parts of Sweden, prove this. In Lapland you will never see such a thing, altho' were we to judge by the situation of the countrey we should imagine just the contrary, especially as the people wear no stockings, as we do, not only single but double, and triple. The Laplander guards himself against the cold in the following manner. He wears breeches made of rhen deer skins with the hair on, reaching down to his heels; and shoes made of the same materials, the hairy part turned outwards. He puts into his shoes *slender-eared broad-leaved cyperus grass*, *carex vesicaria*, Spec. Pl. that is cut in summer and dried. This he first combs, and rubs in his hands, and then places it in such a manner, that it not only covers his feet quite round, but his legs also; and being thus guarded, he is quite secured against the intense cold. With this grass they stuff their gloves likewise in order to preserve their hands. As this grass keeps off the cold in winter, so in summer it hinders the feet from sweating, and at the same time preserves their feet from being annoyed by striking against stones, &c. for their shoes are very thin, being made, not of tanned leather, but the raw hide. It

was

see the vernal flowers begin to celebrate their nuptials, and the trees, one after another, open their buds, and cloath themselves with leaves. It is a matter of wonder why the *wood plants*, as the *spurge laurel*, the *wood anemone*, the *noble liverwort*, the *vernal vetch*, the *broom rape*, the *pasque flower*, the *colts-foot*, the *sage of Jerusalem*, *pilewort*, *violets*, &c. and the garden plants, as the *affara bacca*, *snow drops*, *bulbous violet*, *vernal crocus*, &c. should flower in the very beginning of spring; when we cannot by any pains, or care bring them to flower in the autumn, or after the summer solstice. For it is remarkable that these plants, which are so very patient of the cold in the spring, are yet in the autumn so tender, and weak, that they dye like the Indian plants upon the first hoar frost^s, e. g. the

was difficult for me to find what particular kind of grass they prefer for this purpose, as not being every where the same, tho' always one of the *cyperus grasses*, but i perceived at last that it was what i mentioned above. Thus far Linnæus. I will add, that this grass grows with us.

^s The iron nights, as they are called in the Swedish language, i. e. sharp nights, happen generally at Upsal between the 19th and 3rd of August. e. g. 1746 they began the 19th, 1748 the 17th, 1749 the 1st of Sept 1750 the 20th of August, 1751 the 27th, 1752 the 20th. They seldom

the *blue mountain thistle*, *touch-me-not*, &c. On the contrary we see *succories* and *thistles* never flower before the same solstice, whence the husbandman judges from their flowers, as from a calendar that cannot deceive, that the solstice is past. From hence it is evident, that there is something else besides moisture and heat which promotes the fertility of plants,

§. 3.

In the same manner trees observe fixed laws, and a certain order in their leafing; so that he, who is but moderately versed in this affair,

seldom last above three or four nights. After these barley does not grow, and about the time they come on, the gardeners do not venture to trust their green-house and other tender plants any longer to the open air. At that time the leaves of the *fig*, the *mulberry*, the *walnut*, the *wine*, the *toxicodendrum* and even of the *beech* are shrivelled up. The Indian plants, such as the *kidney bean*, the *African marygold*, the *cucumber*, the *amaranth*, the *convolvulus*, the *tobacco*, the *thorn apple*, &c. dye. Nay sometimes even our native plants, as the *noli me tangere*, the *lesser burdock*, the *bryony*, the *vipers buglos*, the *pimpernel*, the *blue mountain sow-thistle*, the *goosewort*, &c. wither. But before this happens, the *meadow saffron* puts forth its flowers, and that sometimes sooner, sometimes later, according as these iron nights come sooner or later. Barck.

may

may immediately know, when he sees one species of trees in leaf, what species will be next in leaf. Nor do we hardly ever find this order of Flora transgressed. He who should imagine he had found the true cause of this phænomenon in the different depths of the roots of different trees would be mistaken; for then shrubs would always be in leaf before trees of one, and the same kind; which yet rarely happens. This phænomenon therefore arises without doubt from some other cause, hitherto undiscovered, and perhaps explicable only by the different texture of the tree.

The order of the leafing of trees with us is as follows.

- | | |
|---------------------------|-------------------------|
| 1 <i>Red elder</i> | 12 <i>The osier</i> |
| 2 <i>Honey suckle</i> | 13 <i>Alder</i> |
| 3 <i>Gooseberry</i> | 14 <i>Sea buckthorn</i> |
| 4 <i>Red currant</i> | 15 <i>Apple tree</i> |
| 5 <i>Spiræa frutex</i> | 16 <i>Cherry tree</i> |
| 6 <i>Bird cherry</i> | 17 <i>Water elder.</i> |
| 7 <i>Spindle tree</i> | 18 <i>Birch</i> |
| 8 <i>Shrub cinquefoil</i> | 19 <i>Hasel</i> |
| 9 <i>Common elder</i> | 20 <i>Elm</i> |
| 10 <i>Privet</i> | 21 <i>Dog rose</i> |
| 11 <i>Quicken tree</i> | 22 <i>Pear tree</i> |
| | 23 <i>Plum</i> |

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23 Plum tree	28 Aria Theophrasti
24 Buckthorn	29 Asp
25 Berry-bearing alder	30 Maple
26 Lime tree	31 The oak
27 Beech	32 The ash ^t

With the first soft breeze, says Pliny, the *cornelian cherry* puts forth its buds, next the *bay* a little before the æquinox. The *lime*,

^t As i do not know that any thing of this kind has ever been published in England, i will subjoyn the order of the leafing of some trees and shrubs, as observed by me in Norfolk, Ann. 1755.

1 Honey suckle	Jan. 15	19 Marsh elder	Apr. 11
2 Gooseberry	March 11	20 Wych elm	12
3 Currant	11	21 Quicken tree	13
4 Elder	11	22 Hornbeam	13
5 Birch	April 1	23 Apple tree	14
6 Weeping willow	1	24 Abele	16
7 Raspberry	3	25 Chesnut	16
8 Bramble	3	26 Willow	17
9 Briar	4	27 Oak	18
10 Plumb	6	28 Lime	18
11 Apricot	6	29 Maple	19
12 Peach	6	30 Walnut	21
13 Filberd	7	31 Plane	21
14 Sallow	7	32 Black poplar	21
15 Alder	7	33 Beech	21
16 Sycomore	9	34 Acacia robinia	21
17 Elm	10	35 Ash	22
18 Quince	10	36 Carolina poplar	22

the

the *maple*, the *poplar*, the *elm*, the *fallow*, the *alder*, the *filberd* and *basel* are among the first that put out leaves; the *plane tree* also is very early. Nat. Hist. lib. 16. 25.

The foliation or leafing of the first four named trees, 1, 2, 3, 4, varies very much as to the time, and the day on which they break bud; for as the winter goes off sooner or later, so they are in leaf sooner or later. But this does not hold of the rest, e. g. in the year 1750, in which there was scarcely any winter-weather, but the whole was almost a perpetual spring, i observed towards the latter end of March, that the *currant* and *gooseberry* were in blow about Gripenberg; whereas the last year they did not blow till the middle of April. The *oak*, and the *ash* seldom shew their leaves before the night frosts are over^v. For which reason gardeners do not venture to trust their house plants to the open air, till the leaves of the last trees give sign of a mild winter.

^v This agrees with lord Bacon's observations, Nat. Hist. p. 146. that a long winter makes the earlier and later flowers come together. This i observed was the case in the year 1755, when the spring was very backward. The author says in a note, that it has been observed for above ten years past, that the oak has been always in leaf before the end of May, in Upland.

§. 4.

The prudent husbandman will above all things watch with the greatest care the proper time for sowing; because this with the Divine assistance produces plenty of provisions, and lays the foundation of the public welfare of the kingdom, and of the private happiness of the people. The ignorant farmer being more tenacious of the ways, and customs of his ancestors, fixes his sowing season generally to a month, and to a day; whether or no the earth be prepared to receive the seed he little cares. From whence it frequently happens, that the fields do not return what might be expected, and that what the sower sowed with sweat, the reaper reaps with sorrow. Wise œconomists therefore in all ages have endeavored to their utmost to fix a certain time for sowing; but hitherto their labor has proved fruitless. There have been some, who have tryed to discover the qualities of the land necessary for this purpose, by taste and smell; nor have there been wanting to others, who were persuaded, that the smell of the earth, and the *fla divæ virginis**, were infallible signs of seed-time. All

* I do not understand the meaning of these words.

which,

which, although perhaps they are not wholly without foundation, are yet insufficient for obtaining the end we aim at. For the experience of many years has taught us, that the seeds of one and the same species sown in the same ground at different times do not produce equal crops. We have seen even a great difference between what was sown in the morning, and the afternoon. Thus also while one plant is vigorous and flourishes, another of the same nature, and raised in the same soil withers, and dyes. The farmer often throws the cause of scarcity upon Providence, that means to punish an ungratefull people, by ordering the fields to mourn in weeds, and the corn to mock the the threshers toil with empty husks; but it may be with truth asserted, that this surmise is often without foundation. He ought rather to complain of his own imprudence, and accuse himself that his granary is not better stored.

We look up to the stars^u, and without reason suppose that the changes on earth will answer

^u This looking up to the stars for this purpose, was transmitted down to us by the Greeks and Romans from Ægypt, where the seasons being much more regular than in these northern parts, might be as sure a guide in that countrey, as any they could follow. But an astronomical calendar perhaps may

swer to the heavenly bodies ; entirely neglecting the things that grow round about us.

We

be not so good a guide to us as the vegetation of certain plants ; supposing we could once fix on the proper one for sowing each kind of seed. I have been told by a common husbandman in Norfolk, that when the oak catkins begin to shed their seed, it is a proper time to sow barley ; and why might not some other tree serve to direct the farmer as to other seeds ? The prudent gardener never ventures to put his house plants out, till the mulberry leaf is of a certain growth.

It appears from Geminus in his elements of astronomy, that the coincidence of the seasons as to heat, cold, rain, &c. with the risings and settings of the stars, had caused a notion to prevail among the antients, that these celestial phænomena were not merely the signs, but the causes of the different seasons. This notion, which he takes some pains to overturn, would never have begun in such uncertain climates, as are found in these parts of the world. But in Ægypt, where the Nile begins to rise regularly upon the appearance of Sirius, or the dog-star, where the Etesian winds begin, and cease to blow constantly about the same time of the year ; and in general the variation of the weather is nearly uniform, such a notion might easily prevail in the minds of an unenlightened, and superstitious people. From them it was propagated into Greece, where, tho' it must have been frequently thwarted by a much less constant uniformity, yet it might still be upheld by that blind veneration, which generally attends antiquity, especially amongst the ignorant, and unlearned. As for the Romans, they went still farther, for without even adapting an almanack to their own climate and time, they fixed the seasons for husbandry-work of all kinds by the risings and settings of the stars, such as they found

We see trees open their buds, and expand their leaves; from hence we conclude that
spring

found them in the Greek calendars. To this custom Geminus certainly alludes when he observes, that an almanack, which may pretty well foretell the weather in one country is good for nothing in another, as one would think should be obvious at first sight. Yet this he thought necessary to explain, and dilate upon, in order to convince the Romans of their error; for tho', as Petavius observes, the later astronomers went more accurately to work, the prejudice still remained in the minds of the country people, and the vulgar. Whether Geminus thought those predictions concerning heat, cold, rain, drought, &c. which are found in the Alexandrian, Greek, and Roman calendars, just in some of our modern ones, were universally precarious, or whether he only thought they were so in such climates, as that of Rome, where he is supposed to have lived, he commends Aratus for making use of the natural signs, taken from the aspects of the sun, and some of the stars, as also of the signs taken from brutes, instead of the rising and setting of the stars, and gives this reason of his preference, that those predictions, which have some natural cause, have a necessary effect; adding, by way of confirmation of his opinion, that Aristotle, Eudoxus, and many other astronomers, made use of them. These predictions are copied by Virgil, but i do not recollect any place in his Georgics, where the seasons for ploughing, sowing, &c. are fixed by the appearance of birds of passage, or of insects, or by the flowering of plants, which method was begun by Hesiod, but never afterwards attended to, that i know, till Linnæus wrote. Hesiod says, that if it should happen to rain three days together when the *cuckoo* sings, then late sowing will be as good as early sowing. That when *snails*
L 2 begin

spring approaches, and experience supports us in this conclusion; but no body hitherto has been

begin to creep out of their holes, and climb up the plants, you must leave off digging about vines and take to pruning. That when the *artich oak* begins to blow, and the *grasshopper* chirps upon trees, which, as Theophrastus observes, was about the summer solstice, then goats are in full season, &c. That when the *fig leaf* is about as big as a crow's foot, the time for sailing comes on. That when the voice of the *crane* is heard overhead, then is the time for ploughing. It is true, the poet frequently marks the seasons by the risings and settings of the stars, and as astronomy, besides its many important uses, is connected with finer sciences, has something in it very striking to the imagination, and has been cultivated by men, who had leisure to make calendars for general use, it was natural that it should get the ascendant over rules surer perhaps in themselves, and more adapted to the purpose of the husbandman, but which were destitute of the advantages abovementioned, and were most probably looked on only as poetical embellishments.

It is wonderfull to observe the conformity between vegetation, and the arrival of certain birds of passage. I will give one instance as marked down in a diary kept by me in Norfolk in the year 1755. April the 16th *young figs* appear, the 17th of the same month the *cuckow* sings. Now the word *κικυξ* signifies a *cuckow*, and likewise the *young fig*, and the reason given for it is that in Greece they appeared together. I will just add that the same year i first found the *cuckow flower* in blow the 19th of April.

To the instance of coincidence of the appearance of the *cuckow*, and the fruit of the *fig-tree* in Greece and England,
i will

been able to shew what kind of tree Providence intended should be our calendar, so that we might know on what day the countrey-man ought to sow his grain.

The sun acts on the earth by loosening, warming, and preparing it, as the culinary fire does on our meat, for which a certain degree of heat is requisite. For the sun by its heat drives the juices taken in by the roots thro' the vessels of the tree, which do not return by circulation, but become more copious by the daily addition of fresh heat. It. Scan. 23.

i will here add some coincidences of the like nature, in Sweden and England.

Linnæus says, that the *wood-anemone* blows from the arrival of the *swallow*. In my diary for the year 1755, i find the *swallow* appeared April the 6th, and the *wood-anemone* was in blow the 10th of the same month. He says, that the *marsh-marygold* blows when the *cuckow* sings. According to my diary the *marsh-marygold* was in blow April the 7th, and the same day the *cuckow* sung.

I have many other observations by me about the appearances of birds and the flowering of plants, but as they were made for one year only, and there are none of other authors to compare them with, i shall not trouble the reader with them. I have been induced to publish them for reasons that i have mentioned in the preface. Vid. the Calendar of Flora,

§. 5.

Nature always takes the easiest, and shortest way in all her works. He therefore who would imitate her must do the same. No one, i think, can deny but that the same force, which brings forth the leaves of trees, will also make the grain vegetate; and no one can justly assert that a premature sowing will always, and every where accelerate a ripe harvest. Perhaps therefore we cannot promise ourselves a happy success by any means so likely, as by taking our rule for sowing from the leafing of trees. We must for this end observe in what order every tree according to its species, heat of the atmosphere, and quality of the soil, puts forth its leaves. Afterwards comparing together the observations of many years, it will not be difficult from the leafing of trees to define the time, if not certainly, yet probably, when not only *barley*, but *vernal rye*, *oats*, and other annual plants ought to be sown.

§. 6.

To attain this end there were many, who by the exhortation of our president noted, not

less advantage, I think, may be experienced from only early sowing, particularly on light soils, which is, that the seed gets up sufficient to see to the seed from the roots & destroying the blights, & about the same time in a much better manner than the

only the time of the foliation of trees, but the day also on which *barley* was sown, and cut; and were so kind as to communicate to me their observations^w. I acknowledge myself much obliged to each of these worthy gentlemen for the benevolence shewn me on this occasion, and more particularly to D. Torên, who for the space of three years made his observations on a tree of the same species with care and diligence; as also to D. Eric Ekelund, who did the same with the like industry for two years. Some perhaps had not always time, or opportunity to make their experiments with the same attention; for those, who are detained in cities, often want a number of trees to observe these things as they ought, and those, who live in the countrey, are often drawn by domestic affairs from things of this nature. But if observations were made according to the following rules. 1st, That they should be continued for *three years*, and those specified, as well as the *places* in every observation. 2d. That they should be made on the

^w The author gives in a note a list of eighteen persons who had communicated their observations made in Sweden, Norway, Finland, and Lapland, some for one, some for two, others for three years from 1750 to 1752 both inclusive.

same *individuals*. And 3d. on trees which grow on the *same soil*, and in the *same exposition*, as the *field* that is to be sown. Were these circumstances, i say, attended to, perhaps we might be able to form more certain rules for the use of the farmer; but since these rules have been sometimes neglected, our business will not succeed so well; for who does not know that the *north wind*, *shade*, and a *moist soil* hinder the leafing of trees as much as a *dry situation* on the slope of a hill inclining to the south promotes it? Besides many errors have crept into these observations, e. g. some trees between whose leafing there ought not to intervene above two or three days, are often disjoyned from one another by the interval of a fortnight; not to mention the order of leafing § 3, which trees scarcely, or rather never transgress, being tyed down to it by nature herself, but which often does not appear in these journals*.

* In the original there follows a section which i have not translated. The intent of it is to explain a table giving an account of the different days of the foliation of some trees and shrubs in Sweden, Norway, &c. which i have omitted, as thinking it would afford little, or no entertainment to the reader.

§. 7.

If we consider the year 1750, we may remember, that the winter was milder than ordinary, and the spring very early. Whence some in Upland sowed their lands about the end of February; which they scarcely ever do in other years before April. I am not ignorant, that the lands in some of the northern provinces, especially those which abound in clay, require early sowing, that the ground may be broken with less trouble, and that the first shoots of the barley may make their way through it before it grows stiff. But the people of Schonen, and others, that dwell near the sea, sow late whether the spring be early or not; and that sometimes to their great loss, for no other reason but that they received this custom from their ancestors. The most northern inhabitants of Sweden find it necessary to sow, as soon as the frost breaks up; that the short summer may perfectly ripen the grain before the winter approaches. For as eggs require a fixed time for the exclusion of the young, so the barley does in different provinces, to ripen the seed. To prove this I will produce some examples.

Sowing

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		Sowing.	Harvest.	Days
Pithoa.	1740	June 4	Sept. 1	89
	1741	May 29	Aug. 31	94
	1742	27	29	94
	1743	27	26	91
	1744	31	26	87
	1745	24	27	95
	1746	26	25	91
	1747	28	23	87
	1748	June 4	22	79
	1749	May 21	22	93
	1750	19	14	87
	1751	21	11	92

Medium 85

Upfal.	1747	April 28	Aug. 17	111
	1748	29	20	113
	1749	May 6	27	113
	1750	April 16	30	155
	1751	28	24	118
	1752	30	31	92

Medium 105

Sowing

O F T R E E S. 155

	Sowing.	Harvest.	Days.
Nafinge 1750	April 20	Aug. 12	113
toward	May 4	7	95
Norway	19	12	85
	21	14	85
	26	15	81
	June 13	25	73

Medium 93

Korn an 1731	May 28	Aug. 31	95
island of 1732	June 18	Sept. 14	88
Bahus. 1734	May 9	Aug. 18	101
1735	25	15	82
1736	29	27	90
1738	June 3	Sept. 5	94
1739	May 8	3	118

Medium 100

From these observations, which i have produced, and many others, i can conclude nothing at present, unless that the *sowing of barley* nearly coincides with the *foliation of the birch*, at least in Upland, and other places adjacent; and if this sign is not to be depended upon every where, yet it would be easy for us, on a due examination, to find out some other tree,

tree, more suited to this purpose; and which some provinces might use as a calendar, while the greatest part might consult the *birch*. It is a popular error, that less time passes between the sowing, and ripening of wheat in our northern provinces, than here at Upsal, and that this happens because the summer days are longer in the north, and there is scarcely any night to retard its growth. But this error is made evident by the grain ripening in as short a time in Schonen as in Lapland. For barley in the champaign part of Schonen is sown about May the 29th, and reaped sooner than in Upland. But why *barley* ripens later in Upland and Westmania, than in the other provinces of Sweden, is to me absolutely a secret.

§. 8.

If a number of future observations shall confirm the doctrine, which i have been delivering, i do not doubt but that we may reap many advantages from it. For then we should not want a sure guide for the husbandman to regulate himself by in sowing his grain, and for the gardener to sow his kitchen, and other seeds. What great benefit therefore would arise to the public,

public, if one in every province would yearly make observations in this way, and at last communicate them in the same manner, as astronomers do their meteorological ones to the royal society, or academy of sciences?

It will besides be necessary to remark what sowing, made on different days in the spring, produces the best crop; that comparing these with the foliation of different trees, it might appear which is the most proper time for this purpose. In like manner it will not be amiss to note at what time certain plants, especially the most remarkable in every province, blow; that it might appear whether the year made a flower or a quicker progress. For we see, although observations of this kind have yet not come into use, that the mower can guess at the time proper for cutting grass, either from the flowers of the *parnassia*, the *devil's bit*, the *marsh gentian*, or the *bastard asphodel* bursting forth, or from the flowers of the *purple meadow trefoil* withering, or from the ripening of the seeds of the *yellow rattle*, or in higher places from the yellow hue of the leaves of the *leopard's bane*. Would botanists like astronomers note the time of foliation, and flowering of trees and herbs, and the days on which the seed is sown, flowers
and

and ripens; and continue these observations for many years, there can be no doubt, but that we might find some rule, from which we might conclude at what time grains, and culinary plants, according to the nature of each soil, ought to be sown; nor should we be at a loss to guess at the approach of winter; nor be ignorant whether we ought to make our autumn-sowing later or earlier. Lastly, the gardener would have a more sure prophet to consult; whereas now he guides himself by nothing but very fallacious conjectures.

§. 9.

This is all which i think fit to produce upon this copious subject, and i hope the candid reader will not be surpris'd, that i am so short upon it, as it has hitherto not been handled; and is far from being hitherto perfectly understood. It is much above my power to go to the bottom of this affair, but by touching upon it in a summary way i mean to excite men of greater ability, who may treat it in the manner it deserves.

OF THE

USE of CURIOSITY.

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USE of CURIOSITY.

BY

CHRISTOPHER GEDNER.

Upsal, 1752. October 21.

Amæn. Academ. vol. 3.

§. I.

AS the three kingdoms of nature were created for the use of man, since to him alone is granted the prerogative of converting their inhabitants to his own advantage, so that part of knowledge which is conversant about the creatures throughout the terraqueous globe is the first, and chief by which men are enabled to provide themselves with what is necessary, both for the present, and future; and the more so because, besides these three kingdoms, and the elements there is nothing in

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nature.

nature which can be of use to him. All those things by which man is supported and grows, with which he is cloathed, and in which he prides himself, by which he is preserved, and becomes insolent; all the pomp, the splendor, the richness, the luxury of dress, as well as the necessary covering from hence have their origin. Without these things man must be as naked, as he was created, and came into the world. However obvious this truth may be, there is a common question proposed by the vulgar to men, who are busied in examining the productions of nature, and that with some sort of sneer; *To what end are all these inquiries?* By which they mean to insinuate, that these *vertuosi* are at the bottom but madmen, who spend their time in a kind of knowledge, which promises no advantage; and in this way of thinking they are the more convinced of being right, as they find natural history no part of public institutions, not received into academies amongst the philosophical sciences, and as holding no rank either in church, or state. For this reason they look on it as a *mere curiosity*, which only serves as an amusement for the idle, and indolent. This objection has been made to myself, and almost all others who give themselves

selves up to the study of nature, and by its frequent repetition has at last quite worn out my patience. For which reason i think it will not be amiss to consider the question, and prepare such an answer to those, who for the future shall not be ashamed to urge over and over the same objections, as may convince them, if they will take the pains to read the few following pages, and consider them thoroughly. All i desire of the reader is a candid hearing.

§. 2.

The kind of men, who most frequently ask this question; *To what end all these inquiries?* are of a heavy, dull, and phlegmatic disposition, of weak judgment, and low education. Amongst ourselves, in great cities, in large towns, and at academies, the searching into nature ceases now to be uncommon. Nor is this question ever heard among men of solid learning. It is chiefly, and frequently put in the more remote provinces by the inferior order of people; who think of nothing but indulging their low appetites, and look on every thing as useless, which does not serve that purpose.

When electrical experiments first began to make a noise in the world, Samuel Klingens-

erna was sent for by his majesty Frederic the first to shew him some of the electrical phænomena. When all was over, a man of great rank, who happened to be one of the spectators on this occasion, said with a sneer, “ Mr. “ Klingenstierna of what use is all this?” Klingenstierna replied with some acuteness; ‘ Sir, ‘ this very objection was made to me by J. C.’ (this J. C. was a very rich dry falter). Upon which the king said smiling, to the nobleman, i think he has given it you. Such men as these resemble more the brute creation, than rational creatures. They do not consider, that the all-wise Creator made every thing for man’s use. They forget that every thing, which was created at the beginning, was declared to be good. To these men whatever is curious is disgustfull, and inquiries into nature are deemed mere folly.

Ternstöm (Christ.) when he went with the Ostend fleet to the East Indies, was treated with contempt by some of the company for his curiosity *. They thought nothing of consequence, but what belonged to the winds, and waves.

* Bellonius in his Observations, p. 3. says the same happened to him.

Bartscius (John) when he arrived at Surinam, where he went in order to make observations in natural history, was despised for looking after plants, and insects. The inhabitants there thought nothing worth minding, but what belonged to *sugar* and *coffè* plantations. Vid. his letters to Linnæus.

Professor Kalm dared not at the hazard of his life let the savages of Canada, amongst whom he resided, know that he described any plant or other natural object, but was forced to carry on all his researches in private.

When our president was gathering, and describing the *rhen-deer-fly* on the Lapland mountains, the inhabitants wondered, and laughed at him for troubling his head about catching insects. Vid. Act. Stockhol. vol. 1. p. 121. And we find that he, and his companions were stared at as a spectacle in his journey through Oeland. It. Oeland. p. 85. 109.

Dr. Hasselquist was forced to have a guard whenever he went out of Cairo in order to describe any natural object; and even then he was not quite safe from the vulgar on account of his curiosity. These examples may suffice without producing any more.

§. 3.

We were created for the glory of the Creator, which cannot be brought about unless we know him, either by revelation, or the works of the creation. As to the latter I suspect, that many come into the world, and remain here even to old age, who never saw the creation, but from afar; just like the brute beasts, which cannot fail of seeing the verdure, and various colors, that cloath the earth, but go not one step farther. This seems to me as if any one, who should be carried into a botanic garden to see the immense variety of plants brought together from all parts with incredible trouble, care and expence, should only observe that the leaves were green, and the flowers of various colors, just as they are every where else. Could such an one be truly, and justly said to have seen the garden? Or if any one should go into a museum, filled with natural objects of the rarest kind preserved in spirit of wine, and should only attend to the clearness of the liquor, and, though he saw a body hanging in it, should not inquire what body it was; would not he, who took the trouble of shewing these sights to so curious a person,

person, think his time thrown away? Would such a spectator deserve to be let into such a place?

I cannot help on this occasion calling to mind the manner, in which our president used sometimes to excite attention in his audience by an apt similitude, when he was reading upon *insects* to his pupils. The similitude or rather fable was as follows. ‘ Once upon a time
 ‘ the seven wise men of Greece were met together at Athens, and it was proposed that every
 ‘ one of them should mention what he thought
 ‘ the greatest wonder in the creation. One of
 ‘ them, of higher conceptions than the rest,
 ‘ proposed the opinion of some of the astronomers about the fixed stars, which they believed
 ‘ to be so many suns, that had each their planets rolling about them, and were stored with
 ‘ plants and animals like this earth. Fired with
 ‘ this thought they agreed to supplicate Jupiter,
 ‘ that he would at least permit them to take a
 ‘ journey to the moon, and stay there three days
 ‘ in order to see the wonders of that place, and
 ‘ give an account of them at their return. Jupiter consented, and ordered them to assemble
 ‘ on a high mountain, where there should be a
 ‘ cloud ready to convey them to the place they
 M 4 ‘ desired

‘ desired to see. They picked out some chosen
‘ companions, who might assist them in describ-
‘ ing, and painting the objects they should meet
‘ with. At length they arrived at the moon,
‘ and found a palace there well fitted up for
‘ their reception. The next day, being very
‘ much fatigued with their journey, they kept
‘ quiet at home till noon ; and being still faint
‘ they refreshed themselves with a most delici-
‘ ous entertainment, which they relished so well,
‘ that it overcame their curiosity. This day they
‘ only saw through the windows that delightfull
‘ spot, adorned with the most beautiful flowers,
‘ to which the beams of the sun gave an uncom-
‘ mon lustre, and heard the singing of most me-
‘ lodious birds till evening came on. The next
‘ day they rose very early in order to begin their
‘ observations ; but some very beautifull young
‘ ladies of the countrey, coming to make them a
‘ visit, advised them first to recruit their strength
‘ before they exposed themselves to the labori-
‘ ous task they were about to undertake.

‘ The delicate meals, the rich wines, the
‘ beauty of the damsels prevailed over the re-
‘ solution of these strangers. A fine concert of
‘ music is introduced, the young ones begin to
‘ dance, and all is turned to jollity ; so that this

‘ whole day was spent in gallantry, till some of
 ‘ the neighbouring inhabitants, growing envi-
 ‘ ous at their mirth, rushed in with drawn
 ‘ swords. The elder part of the company tryed
 ‘ to appease the younger, promising the very
 ‘ next day they would bring the rioters to
 ‘ justice. This they performed, and the third
 ‘ day the cause was heard, and what with accu-
 ‘ sations, pleadings, exceptions, and the judg-
 ‘ ment itself the whole day was taken up, on
 ‘ which the term set by Jupiter expired. On
 ‘ their return to Greece all the countrey flocked
 ‘ in upon them to hear the wonders of the moon
 ‘ described, but all they could tell was ; for
 ‘ that was all they knew ; that the ground was
 ‘ covered with green, intermixed with flowers,
 ‘ and that the birds sung amongst the branches
 ‘ of the trees ; but what kinds of flowers they
 ‘ saw, or what kinds of birds they heard, they
 ‘ were totally ignorant. Upon which they were
 ‘ treated every where with contempt.’ If we ap-
 ply this fable to men of the present age, we
 shall perceive a very just similitude. By these
 three days the fable denotes the *three ages*
 of man. First *youth*, in which we are too
 feeble in every respect to look into the works
 of the Creator. All that season is given up to
 idle-

idleness, luxury and pastime. 2dly. *manhood*, in which men are employed in settling, marrying, educating children, providing fortunes for them, and raising a family. 3dly. *old age*, in which, after having made their fortunes, they are overwhelmed with lawsuits, and proceedings relating to their estates. Thus it frequently happens that men never consider to what end they were destined, and why they were brought into the world.

§. 4.

As to bodies, the vulgar are ready enough to admire them in the larger kinds of animals, plants, minerals and metals. But when they perceive any one examining into the minute parts of nature, such as *insects* and *shells*, *grasses*, and *mosses*, *earthy particles*, and *petrifications*, they look upon it as idle curiosity. And when they see us searching after such natural productions of foreign countries, as are not found with us, their wonder increases, and they think then they attack us with double advantage. Since we not only spend our time in examining present objects, that are wholly useless, but even such distant ones, as we have scarcely any means of coming at. They have

have no notion that these can be of any manner of use but to those amongst whom they are found. To the end therefore that we may gain a clearer conception of the harmony, and use of these things, it will be necessary to run thro' some of the most obvious particulars, relative to this subject, that every one from hence may better comprehend the advantage of natural history in general.

§. 5.

The antients were of opinion, that the bodies about us concerned us no farther than as they were good for *food* or *physic*. Hence their inquiries all tended to find out what were fit to eat, and what would cure some distemper, and whatever plant or animal could not be referred to one of these classes was neglected^v. It is true that the immediate use of
many

^v I must take the liberty to contradict the ingenious author on this occasion. For any one who has ever looked into Aristotle's history of animals, and Theophrastus's of plants, must at once be convinced of the contrary. This justice i thought due to those two first sketches of natural history, in which the sagacious, and extensive genius of the master, and the disciple fully shine forth. It is true this spirit was not long kept up, nor is it to be wondered at, that extravagant speculations, and systems concerning things out
of

many bodies is hitherto unknown to us, yet we have great reason to believe, that all the bodies in the universe, some way or other, contribute to our advantage. *Hay*, which men take such pains to collect in the summer, is of no use to man immediately, but it is a commodity of the utmost consequence to him mediately, as being the food of cattle of all sorts, without which we could not well subsist. Those minute insects called *tree lice*, that live upon the branches of trees, and plants, are looked upon as of no use to us. These are devoured by *flies*, *cochineals*, *golden eyes*, &c. in their first state; which also seem to be of no use to us, but then many of the *small birds* feed upon

of mens reach, which are pursued in the closet with ease, and when ingenious are apt to strike the imaginations of mankind, should take place of the sober, and painful researches into nature, little minded by the generality of people, and therefore lying out of the paths of reputation. Thus what was so well begun by Aristotle and Theophrastus dropped at once for want of encouragement, and never raised its head again, till after the restoration of learning; when Gesner, Bauhin, Cæsalpinus, &c. in imitation of those first masters, began to revive this part of knowledge; and kindled up a spark, which has never been totally extinguished since, and has been raised into a diffusive light by several naturalists of the last age, and particularly by the excellent Linnæus.

them,

them, and these not only delight us with their fine songs but afford us most delicate food. The *nettle* is a plant which is scarcely eat by any domestic animal (Iter. Scand. p. 15.) but the Author of nature has allotted to it more feeders than to almost any other plant, v. gr. *butterflies*, *moths*, *weevils*, *cherms*, &c. which devour it almost entirely, and these insects are a prey to many birds, which could by no means live on the plant immediately. *Minute aquatic worms*, and those in no small number are eat by the larger, and these are eat by the fishes, and aquatic birds, and these by us ; and besides food these birds supply us with most delicate soft down to warm and repose ourselves upon. It would be tedious to enumerate all the mediate advantages, which we obtain from the most contemptible ; as they are deemed ; both plants and animals.

§. 6.

Many look upon *shells*, and *corals* of various kinds, which are collected and ranged in museums by the diligent inquirers into nature, as an idle curiosity ; since they neither serve for food or physic ; but if these are neglected, how many of the wonderfull works of the Creator
would

would be unknown? What man of sense is not struck with wonder, when he beholds the innumerable objects, which the Author of nature has buried, as it were, in the great abyfs. Objects for color, shape, and mechanifm fo admirable, that they furpafs the imagination of man to conceive without feeing them. If we vifit a royal palace, and there behold the walls covered with tapeftry, pictures, fculpture, and other ornaments, are we not delighted, and even in rapture? We ought therefore to feel the fame pleafure, when we behold the beauties of this our globe. To describe every fhell on this occafion would far exceed the bounds of my design. At prefent i will only mention one, viz. the *knotted marginated Cypræa*. Rump. t. 39. f. C. Argenvnill. t. 21. f. K. Petiv. Faz. 97. t. 8. This is a fmall fhell, about the bignefs of a hazel nut, and is gathered in the Maldiveè iflands by the women along the fea fhore in fuch quantities, that 30 or 40 fhips are loaded with them yearly for Africa, Bengal and Siam; fo that in thofe parts there are large palaces filled with them, where they are preferved as treafures of the greateft value.

Thefe fhells ferve there as gold, and filver with us, for all kinds of commerce. In other coun-

countries other shells are made use of for various purposes; some instead of horns to blow with at their religious ceremonies; some for vessels for washing; some for cups; some for boxes; some for inlaying; all of them far exceeding the best artificial works.

Nor are those innumerable *petrifications*, so various in species, and structure, to be looked upon as vain curiosities. We find in our mountains, and even in the middle of stones, as it were embaumed, *animals, shells, corals*, which are not to be found alive in any part of Europe. These alone, were there no other reason, might put us upon looking back into antiquity, and considering the primitive form of the earth, its increase, and metamorphosis. This is a subject, that would require a whole volume to treat it amply as it deserves.

Wild beasts, and *ravenous birds*, though they seem to disturb our private œconomy, are not without their uses; which we should be sensible of, if they were extirpated^z:

When

^z Thus in Suffolk, and in some parts of Norfolk, the farmers find it their interest to encourage the breed of rooks, as the only means to free their grounds from the grub, from which the tree or blind beetle comes, Vid. Lister's Goedact. p. 265. pl. III. Scarabæus. Melolontha. S. N. 10. p. 351. which in its grub state destroys the roots of corn and

When the *little crow* was driven out of Virginia, and that at the expence of several tons of gold, the inhabitants would willingly have brought them back again at double the price, as we find by professor Kalm. The *vultures* in Cairo are invited yearly, and daily to remain there, as doctor Hasselquist relates in Act. Sac. reg. Scient. Stockhol. 1751. p. 196. et sequ. These creatures of prey cleanse the ground from carcases, and make it wholesome, and pure, and besides they serve to keep up a due proportion between animals, so that one sort may not starve the rest.

The vulgar think, and those who think themselves wiser than the vulgar, make no scruple to say; *let him who has nothing to do employ himself in hunting after mosses and flies.* By which they would insinuate, that searching after the minute plants, and animals is unbecoming, or at least unnecessary for a ra-

and grass to such a degree, that i myself have seen a piece of pasture land, where you might turn up the turf with your foot.

Mr. Matthews a very observing and excellent farmer, of Wargrove in Berkshire, told me that the rooks one year, while his men were houghing a turnep field, sat down in part of it. where they were not at work, and that the crop was very fine in that part; whereas in the other part there were no turneps that year.

tional

tional creature. As for *mosses*, i grant we have not authority on our side; for till the end of the last century, they were almost wholly neglected; but now within these fifty years their history is very near compleat by the diligence of Dillenius. C. Bauhin knew very few *mosses*; Dillenius has described near 600. With unweari'd pains he went through this very difficult, and extensive branch of natural history. But to what end? it is asked. I will not take upon me to answer this question by shewing the particular use of every *moss*, that grows; although i am certain the Lord of nature has made nothing in vain. But i will venture to assert, that posterity will, one time or other, find as many advantages arising from *mosses*, as from other vegetables. I assert this with the greater confidence, because since our acquaintance with *mosses*, we have many experiments, which shew their usefulness, a few instances of which i shall subjoyn. The *bog moss* covers deep bogs with its spongy substance, and thus by degrees turns them into fertile meadows; not to mention its repelling virtue in medicine; at present also its turf is used instead of wood in many provinces, and it is a custom established among the workers in metals to burn it in-

to cinders in their forges. The Laplanders, who lay their children upon it in the cradle, find that it abates the acrimony of the urine. Act. Stock. 1740. p. 421.

The *fontinalis antipyretica*, a kind of *moſs*, contrary to the nature of all other *moſſes*, guards the walls of houſes in caſe of fire. It. Scand. p. 20.

The *maiden-hair* furniſhes a very convenient bed to the Laplander, and the *bear* with this prepares his winter habitation. Moſt of our *tumps* conſiſt of this kind of *moſs*.

The *club-moſs* is uſed for making mats.

The *cypreſs-moſs* furniſhes a yellow dye.

The upright *fir-moſs* frees cattle from vermin, and purges ſtrongly. It. Oel. p. 28.

The *fountain-moſs* points out cool ſprings.

The *hypnum proliferum*, a kind of *moſs*, covers the ground in ſhady places, where no other plant will grow. Iter. Oeland. p. 28.

The *hypnum parietinum* ſerves for ſtoppiag creviſes in walls.

All the kinds of *hypna* and *brya* ² cover the earth with green, and keep it from being quite naked, as in beech groves and in the woods of both the Indies. They preſerve the minute ſeeds of plants during the winter, ſhelter their

² Names of *moſſes*.

roots and keep them from freezing; and gardeners gather *mosses* in the autumn, in order to preserve their plants from the frost; they are gathered by the birds to build their nests; they grow in the most barren soil; by degrees they rot towards the bottom, and thus lay a foundation for fertility.

The *bryum hypnoides* covers the rocks in the coldest mountains.

The *mnium hygrometricum* shews the driness, and moisture of the atmosphere.

Some kinds of *brya* cover the mountains, others the marshes, some are usefull in moist meadow ground, some spread over the naked fields, some are found upon stones, and rocks, others on trunks of trees; and all of them bear the most severe winter, when the generality of other plants grow sickly.

§. 7.

As to the *lichens* or *liverworts*, they are not of less use; for many of them afford a beautiful dye. e. g. the *roccella* yields a most valuable red color, Act. Soc. reg. Scien. 1742. p. 21. to which purpose the *lichen tartareus* serves as a succedaneum. The *lichenes stygius*, *onophalodes*, &c. afford also a red dye, and the

lichenes croceus, vulpinus a good yellow. There is no doubt, but that many colors in process of time may be obtained from this kind of plants.

If we consider the virtues of the *lichenes* or *liverworts* upon animate bodies taken internally, they are not inconsiderable. The *lichen vulpinus* is a deadly poison to wolves. It. Scan. p. 40. The *lichen pyxidatus*, or *cup-moss*, is efficacious in the whooping cough. The *lichen jubatus*, or *rock-hair* in exulcerations of the skin. The *lichen omphalodes* in stopping hæmorrhages. The *lichen apthosus* in thrushes, and against worms. The *lichen caninus* or *ash-colored ground liverwort*, in the hydrophia and madness. The *lichen pulmonarius*, or *lungwort*, is found to be good in consumptions. The œconomical use of the *lichens* is of no small consequence. e. g. the *lichen rangiferinus* affords the most delicious pasture to the rein-deer. Upon this the whole œconomy of the Laplander turns, and by the help of this many millions of men are supported. This *lichen* is also given to other cattle by the people of Norland. Act. Soc. reg. 1742. p. 153. Some of the kinds of *lichens* are the delight of *goats*. The most barren woods, where no other plants grow, afford us the
lichen

lichen islandicus, which in times of scarcity serves instead of bread. Act. Soc. reg. Sc. 1742. p. 154.

The *lichen prunastri*, or *plumb-liverwort*, is ground to powder for the hair.

The *lichen pustulatus* may be converted into a very black pigment. The very *small lichens* called *leprosus*, cover barren rocks, and makes them look pleasant; it gives birth to black mould, and consequently affords the first degree of vegetative power. After all this can any one justly say that the knowledge of these plants is useless?

The *mushroom* kind also make a class of vegetables by no means to be despised. One species is used in amputations and hæmorrhages, and another is lately come into reputation for stopping the bleeding of arteries; insomuch that the inventor of this use of it was amply rewarded for the discovery.

The *truffle* and *phalli* contribute to make our soups more delicate, and are commonly used at the tables of the great. Many *mushrooms* are eat by the Muscovites and the inhabitants of other countries, but some of them are a most deadly poison; so that it is of the utmost consequence not to commit mistakes in this part of knowledge.

There is a *mushroom* called *agaricus muscarius*, on account of its driving away flies, and the same plant is the safest remedy hitherto discovered to destroy the *bug*. Thus the knowledge of these plants is of great use to man.

§. 8.

* The *grasses* also are a kind of plants of great value, as affording food for cattle.

The *reed canary grass* serves for thatching houses.

The *meadow fox-tail grass* is an excellent *grass*, which may be sown to advantage in low meadows. It. Oel. p. 156.

The *turfy-hair* causes the meadows in the regio cuprimontana to be so extremely fertile. Act. Soc. R.S. 1742. p. 30.

The *water meadow* is a large and very useful *grass*, which grows by the sides of most ditches and rivers. It. W. Goth. p. 41.

The *narrow-leaved meadow* is the most common pasture in our parts.

The *seed of the flote* or *manna grass*, affords a very pleasing and wholesome nourishment to man.

* Who is curious to know more of these *grasses* may consult the last piece in the book, intitled, *Observations on grasses*.

The

The *sheep's fescue* makes our sheep very fat.

The *perennial darnel* is the best *grass* for hay on chalky hills.

The *sea lyme-grass* and *sea mat-grass* keep the sands on barren maritime tracts from being blown away.

The most minute seeds of *grass* afford nourishment to small birds. The *grasses* besides give a most agreeable color to the earth, and fill up the intervals between plants of other kinds; so that they serve both for pleasure, and utility. The Creator has assigned certain species of *grass* to every different species of soil, which the husbandman is obliged to know in order to make the most advantage of his lands. Besides certain *grasses* are eat by some animals, and left untouched by others; so that without the knowledge of these he cannot avoid falling into error. It. Scand.

§. 9.

He that would exercise the art of husbandry with the greatest advantage, ought to endeavor to get acquainted with all kinds of vegetables, and find out what sort of soil suits each of them best. He ought to know, that some delight in open and exposed situations, others in shady; some in moist ground, others

in dry; that some plants thrive most in sandy soils, others in clayey, others in black mould, others in spongy ground, others in watry; some ought to be sown in pools, others on the tops of hills.

Those barren deserts called Alvacu on the mountains of Oeland, It. Oel. p. 206. had long ago been covered with the *crocus*, from whence the inhabitants might have reaped great benefit, if the nature of that plant had been known to them. Our alps, that are more than a hundred miles long, had not remained to this day a mere waste, if our industrious husbandmen, who not long since began to improve the œconomical arts, had known how to cultivate such plants as might have been usefull in food, or physic; and if they had known what usefull trees, and herbs grow on the forreign alps, viz. the Swiss, the Sibirian, the Pyrenean, the Valesian, &c. from whence they ought to have got seed.

The banks of our lakes produce scarcely any thing but *rusches*, *horsetail*, *water lilly*, *pond-weeds*, *reeds*, &c. where nevertheless a great number of plants fit for food might be sown, such as *zizany* of Canada, *water caltrops*, &c.

Every province has its plants, which choak
the

the grain, and render the fields foul, and poor. It. Scand. p. 421. Books of husbandry are full of inventions how to break the earth by instruments, and fit it to receive the seed; this kind of knowledge is insufficient, as long as the husbandman is unacquainted with the nature of those various herbs, to which agriculture ought to be adapted. From hence the necessity of natural history appears.

§. 10.

It is also necessary for the husbandman to know the duration of every plant he sows in his fields, and meadows, viz. whether it be perennial, biennial, or annual. He who wants to know the use of our plants in œconomy, and how few there are, whose use is hitherto discovered, let him look over the *Flora œconomica*. Amæn. Academ. vol. 1^a.

We see how many in a time of dearth suffer for want, fall into diseases, and even perish,

^a The piece here referred to is full of new observations on the uses of plants hitherto not attended to. I wish I could have made such a translation of it, as could have been instructive or entertaining to the public; but a long list of the names of plants, which could have conveyed no ideas to such readers, as this work is intended for, must have been very tedious, and very useless.

for no other reason but because they do not know what plants are eatable, and how great a plenty there is of them in our countrey, of which D. Hiorth in this volume has given an account, which the most illustrious senator Baron Lowenheilm has translated into Swedish. Many people wonder, why the curious enquirers into nature will give themselves so much trouble about exotic plants; but they do not sufficiently consider, that many kinds of *grain*, many *roots*, *legumes*, *fruits*, *salads*, and *trees* in common use with us for nourishment, household utensils, cloathing, and ornament are originally exotics. Here follows a list of some, which have lately been brought into our countrey from the farthermost parts of Sibiria, that contribute to adorn our gardens, and change our œconomy.

Larkspur, *monks-hood*, *adonis*, *vetch*, *cow parsnep*, *French honey-suckle*, *astragalus*, *othonna*, *bastard-saffron*, *greater centory*, *colombine*, *dracocephalon*, *speedwell*, *claytonia*, *flax*, *hyacinth*, *lilly*, *lychnis*, *poppy*, *cat-mint*, *yellow-flowered sage*, *hooded willow herb*, *byssop*, *wild navew*, *St. John's wort*, *sow-thistle*, *saw-wort*, &c. From that distant countrey we have the *robinia's* and a *honey-suckle*, that make excellent quick-hedges;
from

from thence we have the Sibirian *nettle*, that serves for making sacks. If we had a more compleat knowledge of plants, that grow in the southern parts of Asia, and America, we should be able to make more ample, and usefull experiments.

To preserve our woods we want to be provided with quick-hedges, for which purpose many kinds of trees are serviceable, such as the *gooseberry bush*, the *black-thorn*, the *white-thorn*, the *berberry*, the *sea buck-thorn*, the *alder*, the *fallow*, &c. provided each be planted in a proper soil.

§. II.

We have some of our most efficacious medicines, and best spices from the southern parts of the world; and were it not for the curious in botany they had been neglected; as the *lignum colubrinum* was for a long time. What end would it serve to know, that the *senega root* was good against the bite of serpents, unless botanists had also known the plant? And who would ever have dreamed, that our *milk-wort* would answer the same intent? What end would it have served, that professor Kalm was
witness

witness to the efficacy of the *Virginia avens* and the *monacda* in intermitting fevers, and of the root of the *ceanothus*, and *diervilla* in venereal cases; if we had not learned how to raise these plants? Or to what end would it have served to cross the ocean, and attain the American *water gladiole*, if we had not found out that it was of the genus of our *water gladiole*? The Europeans at vast expence went on buying the *moxa* from China, the *figwort* from Brazil, and the *jachaschapuch* from North America, till it was known that they grew in our own countrey.

§. 12.

There is, as it were, a certain chain of created beings, according to which they seem all to have been formed, and one thing differs so little from some other, that if we fall into the right method we shall scarcely find any limits between them. This no one can so well observe, as he who is acquainted with the greatest number of species. Does not every one perceive, that there is a vast difference between a stone and a monkey? but if all the intermediate beings were set to view in order, it
would

would be difficult to find the limits between them. The *polypus* and the *moſs* joyn the vegetable, and the animal kingdom together, for the plants called *conſervæ* and the animals called *coralline*, are not eaſy to diſtinguiſh, and the *corals* connect the animal, vegetable and foſſil world.

Hence the botaniſts of this age have been buſied about ſettling natural claſſes, which is an affair of the greateſt importance, and difficulty; but ſince the vegetables hitherto diſcovered are not ſufficient for that purpoſe, this part of knowledge is not compleat. It is therefore incumbent on botaniſts to get acquainted with exotic plants, that they may arrive at the end deſired. If all the *columniferous* plants except the *muſk-mallow* were known, the *turnera* never could be referred to this order, but that, as ſoon as it was examined, connected the *turnera* with the *columniferous* plants.

Where the natural claſſes are ſettled we find the vegetables ſo near akin to one another, that we can ſcarcely diſtinguiſh them, as in the *umbellated*, the *ſiliquoſe*, the *leguminoſe*, the *compoſite*, &c. moſt of theſe orders grow in Europe,

Europe, and therefore could be easily known, and ranged.

He that knows but a few plants gives characters, which are easy to find out, but are insufficient to settle any thing; and therefore tend to confound, rather than to advance knowledge; so that the natural method is the ultimate end of our systematical inquiries. Without this all is a mere chaos, and if the knowledge of vegetables fails, all that use of them is gone, which the learned in this way might discover to the great benefit of mankind.

It is true indeed that vegetables act upon the human body by smell, and taste; but these marks are not sufficient unless we know the natural orders of plants.

These being known, and the virtues of some vegetables being discovered, we may go on safely in the practice of physic, otherwise not. It follows from hence, that he who desires to make any considerable improvement in this branch of knowledge, must endeavor to get acquainted with those plants, whose use he does not know; and thus he is obliged not to neglect the most contemptible. e. g. no body
was

was able to form a right judgment of the *cas-carilla*, who did not know its natural order. No physician would have even suspected, that our *milkwort* would be usefull in the bite of serpents, and inflammatory fevers, unless the principles of botany had led him to it. No one has even thought of trying the *mitreola Americana* against the bite of serpents, which yet without ever seeing it, we may certainly conclude to be efficacious in those cases from the *ophiorrhiza Asiatica* or *true lignum colubrinum*^b. When botanists knew the above-mentioned *turnera*, but were ignorant to what natural class it ought to be referred, no man could guess

^b This root is known in the East-Indies to be a specific against the poison of that most dreadful animal called the *hooded-serpent*. There is a treatise in Amæn. Acad. vol. 2. upon this subject, wherein the author Joh. And. Darelius undertakes, from the description of such authors as had seen it upon the spot, to ascertain the plant from which the genuine root is taken. It appears in this account that it had puzzled the European physicians, and what had been sold in the shops for it is the root of a very different plant and of a poisonous nature.

The true root is called *mungos* for the following reason. There is a kind of *weasel* in the East-Indies called *mungutia* by the natives, *mungo* by Portuguese, and *muncas* by the Dutch. This animal pursues the *hooded-serpent*, as the *cat* does

guesſs its virtues. But now that we know, that it is of the *columniferous* order, we may without experience be aſſured that it is of the emollient kind.

Without this knowledge of the natural orders, the *materia medica* would be ſtill as uncertain, as amongſt the antients, which is of the utmoſt importance to us if life and health be ſo.

§. 13.

We are ready enough to put a due value on the larger animals, but many look on the minute tribe of inſects, rather created to torment, than to be uſeful to mankind. We

does the *mouse* with us. As ſoon as this *ſerpent* appears the *weeſel* attacks him, and if ſhe chances to be bit by him, ſhe immediately runs to find a certain vegetable; upon eating which ſhe returns, and renews the fight. The Indians are of opinion, that this plant is the *mungos*.

That celebrated traveller Kæmpfer, who kept one of theſe *weeſels* tame, that eat with him, lived with him, and was his companion, wherever he went, ſays he ſaw one of theſe battles between her and the *ſerpent*, but could not certainly find out what root the *weeſel* looked out for. But whether the *weeſel* firſt diſcovered this antidote, or not, yet it is certain, adds Darelus, that there is a root, which is an infallible remedy againſt the bite of the *hooded ſerpent*. And this he undertakes to aſcertain.

grant

grant that they are very troublesome to us. But is therefore all care about them to be given up? by no means. On the contrary we ought to contrive means to get rid of them, that they may not destroy both us and our possessions. This cannot be brought about unless we know their nature; when that is known we shall more easily find out remedies against them^c. The use of insects has been sufficiently explained by the noble Carolus de Geer, lord of the bed-chamber to his majesty, in an oration which he made in the academy of sciences at Stockholm. Another of my fellow-students has undertaken to explain what damages insects of various kinds do us, and another now is actually employed in shewing what kind of insects live

^c We have lately had a proof that the knowledge of the nature of insects may sometimes be serviceable to us. The sagacious Dr Wall of Worcester, upon seeing the case of the Norfolk boy, who was cured of worms, by taking down a large quantity of white lead, and oyl, guessed that the cure was performed by the oyl, knowing that oyl is fatal to worms and other insects. Upon this he has since tryed oyl in worm-cases with a great appearance of success, an account of which i saw in a letter from him to be communicated to the Royal Society. That oyl is destructive to worms was known to the antients, as appears by Arist. Vid. Hist. Anim. lib. 8. c. 27.

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upon

upon every plant^d. This makes it unnecessary for me to enlarge at present upon the almost incredible mischief insects do us. I will only in a very few words mention, that we shall never be able to guard ourselves against them, but by their means. For as we make use of *dogs*, and other beasts, in hunting down *stags*, *boars*, *hares* and other animals, which do us much damage in our fields and meadows; or as *hawks* may be bred up to as so assist us in taking *herons*, *larks* and other birds, so also we might make use of the fiercer kinds of insects, in order to get the better of the rest of these troublesome animals.

We shall never be able to drive *bugs* out of our houses, before we introduce other insects that will devour them, v. g. the wild *bugs*, &c.

We have no easier method of destroying *knats* and *flies* which cause us so much disturb-

^d The two last-mentioned persons hinted at are, i imagine J. G. Foikahl, and M. Baekner, the first of whom has written a treatise shewing the plants which different insects live upon, the last a treatise on the mischiefs done by insects. Both these are published in Amæn. Acad. v. 3.

ance, than by providing ourselves with the *libellula*, which devours them, as the *kite* does poultry. We oftentimes find our largest trees entirely stripped of their leaves by the *caterpillars* of the *moth* kind, &c. but when we search after them we find they are all eat up by the larger kind of *carabi* called *sycophantæ*; from whence we may learn, that there is no remedy more efficacious in our gardens, where leaves, flowers, and fruits are almost every year destroyed by those *caterpillars*, than gathering and preserving the above-mentioned *carabi* till they lay their eggs, and then placing them at the roots of trees in rotten wood, till they are hatched. And thus we should effectually guard our trees from these inhospitable guests.

§. 14.

But if we do not think it worth our while for any other reason to turn our attention to the works of nature, yet surely for the glory of the great Creator we ought to do it, since in every plant, in every insect we may observe some singular artifice, which is not to be found in any other bodies; and upon comparing

these together, we may be convinced, that this does not happen by chance, but was contrived for some certain end, viz. either the propagation, or preservation of the plant or animal with respect to those other bodies. We find how many plants are fenced against the inclemencies of the elements, and the devastations of animals; and how every animal is furnished with some means, by which it may defend itself against the depredations of the rest; so that no species can ever totally perish, which has been created.

Lastly, from the contemplation of nature we may see, that all created things some way or other serve for use; if not immediately, yet by second or third means. Nay we may see, that what we imagine, to be most noxious to us is not seldom highly usefull. Without some of these things our œconomy would suffer extremely. Thus were there no *thistles* or *briars*, the earth would be more barren. We ought not to overlook the minuteest objects, but examine them with the glass; for we shall then perceive how much art the Creator has bestowed upon them.

He who beholds one of the *jungermannia*, a kind of *corack* with a microscope, must be
forced

forced to confess, that he beholds a most stupendous, and wonderful phænomenon. Many thousands of people are supported by rye-bread, not one of them perhaps ever saw, in how surprising a manner its husks are armed; which any one, who is desirous, may see by the help of a glass.

The day would sooner fail me than matter, were i to take notice of every thing, which this subject affords. Let this then be looked upon as the end of created beings; that some may be usefull to man as physic, others as aliment; some in œconomy immediately, others mediately; some vegetables prepare the ground, some protect those which are more tender, others cover the earth with a green, and most beautifull tapestry, and that perennial; some form those groves to which we fly for coolness, others adorn our globe with their most elegant flowers, and regale our nostrils with their most delicious odors. Lastly, all things demonstrate abundantly the omniscience of the wise Creator, who created nothing in vain, but contrived every thing with so much artifice, that human art, however great it may be, cannot imitate the least of his productions. If we neglect therefore to consider these ob-

jects, they would be like pearl thrown before swine. I beseech you then, who ask me with a sneer to what end this or that stone, plant or animal serves, i beseech you to awake, and open your eyes while you live in this world. All these things are not the work of man, but of wisdom itself, which created both thee and me. He has settled an œconomy in this globe, that is truly admirable by means of an infinite number of bodies, and all necessary, which bear some resemblance to one another ; so that they are linked together like a chain. For as in our œconomy neither the plough, nor the hedges, nor the dunghill are fit for food, or physic, yet are absolutely necessary, so in the œconomy of nature there are many things, that are as necessary, but not immediately. Men reckon their œconomy amongst the chief of human inventions, consider then the sublimity of the divine œconomy. You see therefore that it must at last be granted me according to the opinion of divines and philosophers, that every thing was created for the use of man, and man for the glory of the Creator. Can you then believe, that any thing can be useless that serves not for food, or physic ? The Creator has so framed
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the world, that man should every where behold the miraculous work of his hands, and that the earth should afford an endless variety, seemingly with intent that the novelty of the objects should excite his curiosity, and hinder him from being disgusted by too much uniformity, as it has happened to some wretches, whose station in life placed them above labor, and who wanted curiosity to look into these things. Some objects were made to please the smell, the taste, the sight, the hearing, or other senses, so that nothing can be said to be without its use. That branch of knowledge which serves to discover the characters of natural things and teaches us to call them by their names, seems perhaps by no means necessary. But let it be considered that the first degree of wisdom is to know things when we see them, i. e. to know them by their names; and without this knowledge scarce any progress can be made. To know the letters of the alphabet, to joyn them into syllables, to understand words is not solid erudition; yet it is absolutely necessary for him, who would become learned. Thus the characters, and names of things must be thoroughly learned in order to obtain any use from natural history.

We find in the journals of travellers, many things mentioned, partly curious, partly useful concerning animals, plants, and stones; but those observations can be of no use to us, till we are able to refer each to its genus; that we may make them a part of the system, and know that this curiosity, or use belongs to this, or that object, when it happens to come in our way.

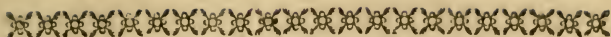
§. 15.

If man was created to give praise to his Creator; if the Creator has made himself known to man by creation, and revelation; if all created things are formed with wonderful mechanism; lastly, if all things were created for the use of man, and nothing but natural things, and the elements can be of use to him; then it may be inquired with the same reason, to what end any other thing was created, as well as man; the supreme Being having created nothing but for a certain end, and for some valuable purpose. We are often ignorant what that purpose is, but it would therefore be impious to say, that any thing was created in vain, since he declared that *every thing which he had created was good.* Gen. i. 31.

O B S T A C L E S

TO THE

Improvement of PHYSIC.



O B S T A C L E S

T O T H E

Improvement of P H Y S I C.

B Y

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Amæn. Acad. vol. iii.

P R E F A C E.

ALthough physic in its whole extent has received great improvements in this age, as most of its parts have been diligently looked into and reformed; yet its chief strength seems to consist in accurate knowledge of diseases, and medicines, and when we turn our eyes on the present times, we find that many simple medicines have been neglected; which so little deserve it, that they rather ought to be revived,

vived, and brought into practice. Which being the case i have frequently endeavored to find out the cause of this common ignorance. The result of my inquiries i submit to the judgment of the candid reader in this academical exercise, which, though far from compleat, is the best i could produce, and i hope it may prove of some use, and meet with a favorable reception.

Various causes have concurred to bring many medicines into neglect.

I.

Fashion which prevails in physic, as it does in every other earthly thing. Hence physicians prescribe according to certain received forms, not sufficiently considering, whether the success answers. To this must be referred the frequent change of remedies.

Brooklime, borragé, bugloss, plantain, saxifrage, are properly only kitchen plants. *Larkspur* is scarcely of any use, but to adulterate syrup of violets, for which purpose it ought not to be used. *Bugle, motherwort, eye-bright, poley-mountain* of Crete, are kept in shops more from custom, than for any good, and sufficient reasons. The *knot-grass* is retained; while

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on the other hand the *bear-berry* has been neglected, though an efficacious astringent. The *grafs of Parnassus*, and *sun-dew*, have crept into the shop by chance. The *carline thistle*, an excellent remedy in hysteric complaints, is neglected. Those poor wretched plants the *vervains* increase the number of officinals without any merit of their own, and only supported by the testimony of antiquity.

2.

The many theories and hypotheses of physicians that vary in every age. For men have been vain enough to imagine that they knew the immediate causes of diseases, the manner in which medicines operate, and from their principles have undertaken to deduce the virtues of medicines.

Formerly *hot* and *volatile* medicines were used in acute distempers. At present the *acid*, *cooling*, and *diluting* with *bleeding* are recommended. *Musk*, *ambergris*, *civet* were looked upon as most efficacious in *eruptive fevers*, now just the contrary. And thus *meadow-sweet*, *woodruff*, *musk* *cranés bill*, may in their turn come into credit, which now are seldom used for
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driving out these eruptions; though we may be assured of their vertues by undoubted experiments long since made.

3.

The neglect of specifying distempers. Hence remedies, which are excellent for some diseases in one man; nay even those very remedies that get the name of specifics on account of some very remarkable vertue, when administered to another, are either of no service, or even do mischief; whereas they would perhaps never fail of a good effect, if the species of the distemper were the same. Therefore till physicians regulate the doctrine of diseases in the same manner, that botanists have done that of plants, medicines must be necessarily precarious *.

Were any one to set about curing the *hæmorrhoidal colic* in a *plethoritic constitution* by *spirituous and hot carminatives*, which are proper for the *flatulent colic* in a *cold*, and *phlegmatic constitution*, he would soon find most fatal proofs of his error. Of this a very remarkable instance may be seen in

* As well as i remember this observation is taken from Sydenham. But whoever is author of it, most certainly physic must ever be very imperfect, till this grand desideratum be performed.

diff. med. dni. Arch. Bæck. de medicam.
domest.

4.

An hasty and imprudent judgment about poisons, and their difference from medicines which in reality differ only in degrees of strength. Hence our ancestors scarcely ever dared to prescribe the use of plants, which they imagined to be poisonous.

The *laurel* is neither used in consumptions, nor venereal complaints, though an excellent remedy ; because it is suspected to be poisonous. The *pasque flower*, whose root is very efficacious in hysteric complaints, is gone out of vogue ; because Helvigius knew a person who dyed upon using a syrup made of it ; as if all inebriating drinks were to be discarded, because some have lost their senses, and lives by an inordinate use of them. The *lignum colubrinum* *, that is famous in venomous bites, and the quartan ague, is neglected for the same reason. Scarce any one dares

* In vol. 2. Amæn. academ. there is a treatise on the *lignum colubrinum*, in which the author undertakes to determine from what plant this root is taken, and observes that druggists, for want of a proper description, have confounded it with two other plants, one of which, and that generally in the shops, is of a poisonous nature.

recommend the use of the *mandragora*, although Schopperus has shewn its vertues in the gout. The *deadly night-shade* is not yet brought into practise, though we have great reason to expect much from it in dispersing tumours of the breast ^f.

5.

The abuses of quacks, and their bold, and dan-

^f I cannot omit saying a word or two on the subject of the *deadly night-shade* on this occasion, as the trial of it caused so much noise in this town some time ago. I know the generality of people look on its fate as decided; and that it is destined never to revive again; but that is not clear to me. Some of the faculty still entertain a good opinion of it, and have seen some benefit done by it. *Antimony* was once entirely discarded out of physick, yet we have seen it since become one of the most fashionable remedies in many diseases. New medicines, and particularly of so strong a nature as the *night-shade*, do not come at once into vogue. The not being able to ascertain the proper manner of giving it, the uncertainty in what cases it ought to be used, and how to obviate the inconvenience attending its use, not to mention many other reasons; these, i say, joined together, are fully sufficient to overturn a medicine of the most promising appearance for a time. But whatever may be the fate of the *night-shade* itself, the disinterested zeal of my worthy friend Mr. Gataker to find out some remedy for the most dreadfull and desperate of all diseases; and the candid manner, in which every circumstance, relating to that affair was communicated to the public, must entitle him to the esteem of every humane person.

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gerous experiments. These have made many patients averse to some of the most celebrated medicines, insomuch that a physician dares not prescribe them. For some timid injudicious friend is always at hand to impose upon their weakness, and let them know, that they are going to take a remedy, which had proved fatal to others; not considering that it was owing to the wrong application, and not to the nature of the remedy.

The *bellebore* formerly cured many deplorable distempers, but by the errors of quacks, and their immoderate doses, it has so happened, that it is fallen into disuse; but the *wild cucumber* and *bitter apple* are beginning to revive again. The bark of the *berry-bearing alder* is a very excellent purge, yet physicians have been almost afraid to prescribe it, perhaps terrified by the ill success of those daring men above-mentioned, who gave too large doses of it. Many of the moderns for a long while dared not make use of opium even externally.

6.

The timidity, and caution of physicians lest they should hurt their patients by violent remedies.

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For which reason they give rather mild, than efficacious ones, and act the part of spectators, rather than physicians.

For this reason perhaps the disciples of Stahl reject the *bark*; though from ignorance of botany they use the *cascarilla*, which is certainly a very good medicine in shiverings, but not totally void of malignity. Physicians did not for a long while presume to prescribe the *wild cucumber*; which is indeed pretty violent, but by no means so terrible, that it ought not to be used even in the dropfy. For the same reason they did not venture to use the *squill*, whose vertue is very great in thinning viscidities; viz. because they did not know the proper dose of either of them. The *gamboe* is neglected, though the Turks have taught us its efficacy in a quartan; and the experiments of our president in the hospital at Stockholm have confirmed their practice.

7.

Small doses of physic. For while physicians have been over-cautious in their prescriptions, they have fallen into the inconvenience of doing the patient no service; and to confess
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the truth, i suspect they more generally err this way at present; while they order drachms of plants for an infusion, where ounces would be more proper. On the other hand mountebanks, and quacks, men of an intrepid mind, and invincible impudence, oftentimes make a cure, when the physician of probity fails.

If any one were to prescribe only two grains of *rhubarb* for a purge, he might as well do nothing at all. The *honey-suckle* is used in decoctions, but not in the quantity necessary; for which reason its virtue in purifying the blood is known but to few. The dose of the *china root* ought to be large, or no good can be expected from it in venereal cases. Those remedies which are sought for amongst vegetables for curing the venereal disease are perhaps given more sparingly, than they ought.

8.

The ignorance of apothecaries in botany, who often sell one plant for another; by which means, when the desired effect is not obtained, the physician is deterred from the use of them for the future.

For *rad. hermodact*, which is recommended

in the rheumatism, the apothecary sometimes gives the root of the *meadow saffron*; sometimes of one of the *irises*, which differ from it in vertue. Hence the effect of the physician's prescription being uncertain, he is at last obliged to give it up entirely. For the *scabious* they give the *centaury*, Fl. Suec. 708. For the *brankursine*, the *cow-parsnep*, 231; the root of the *toothwort*, which is excellent in the tooth-ach, is neglected, because the apothecary does not know, whether it ought to be taken from the *toothwort* 565, or 518, or some other plant. Instead of the root of the *burnet saxifrage*, which is a good astringent in the hæmorrhage, the root of the *burnet* is wrongly substituted. To this may be referred the mistake of selling the *St. John's wort* 624 for the *St. John's-wort* 625, which is vulgar and good in worm cases.

9.

The ignorance of physicians in botany, or their want of care to reject useless, spurious and improper succedaneums.

We suspect that this formerly was the case; but now, that the knowledge of botany is carried

carried so far, we have reason to hope, that things will go better. The *acmella* which is very serviceable in the stone, since it is extremely rare, and dear, is to be supplied out of those plants which are really akin to it. This choice belongs to the botanist: for which reason our president has obliged the world by informing it, that the *siegesbeckia*, as nearest allied to the *acmella*, may be rightly substituted in its room^g; which Dr. Hasselquist has confirmed by an experiment made here at Upsal upon a young man afflicted with the stone. The skilfull in botany will easily judge that the *German leopard's bane*, as well as the *common*, carries suspicion of poison; yet the former has been looked on as harmless by those, who were ignorant of botany, and the latter dangerous. The *duisy* is cried up in vain on account of the excellent virtue it is supposed to possess. Practitioners, unless they be skilfull in botany, will scarcely allow the *wild rosemary*

^g Vid. Amænit. Academ. vol. 2. p. 151. where some succedaneums to the Senega root are mentioned, founded on the same principles.

to be a most efficacious remedy against the hooping cough; which yet is commonly used in this disease by the Westrogoths. The *Turkey baum* is kept in our shops, altho' much weaker than the *Canarian*, which is excluded. The *white saxifrage* and *dropwort*, tho' neither of them has any extraordinary quality, yet hold a place amongst our officinals. The *mechoacana* is seldom used, as being of no great strength, yet it is a very proper purge for infants. The *oak of Jerusalem* is gathered from the *European* plant, whereas both taste and smell instruct us, that we ought to get it from the *American*, as a most powerful remedy in consumptions. The plant, and stalk of *black currants*, no contemptible medicine in the *hydrophobia*, in *feverish dysenteries*, and other contagious distempers, are now neglected, as the antients have said nothing about their vertues; which yet are discoverable by the smell, tho' not by the taste.

10.

The use of compound medicines. Simples are
so

so very rarely used, that the vertues of plants are not known for want of experience.

It is scarcely necessary to produce instances of this assertion. Whoever turns over the writings of the antients will be astonished at the prescriptions, or rather indexes, in which numberless things are mingled together. This affair ought to be looked into, and regulated; that we might not fall under the lash of some future Serenus Sammonicus, who might address himself thus to some physicians:

Ye jumble in one mass such costly juices,
So various in their natures, in their uses;
That the poor patient, who relies upon you,
At once is cheated of his health, and money.

II.

The mixing things together of a different nature. For oftentimes many things are confounded together, which separately administered might assist the patient, and give credit to the physician; whereas mixed they become useless, one destroying the effect of the other.

Thus *watery* mixed with *dry*, *viscous* with
saline, *glutinous* with *stiptical*, *sweet* with

acrid, acid with bitter, sapid with nauseous,
mutually weaken each other ^h.

12.

The ignorance of the natural classes. From hence it happens that we cannot form any judgment, conformable to botanic principles, of one plant from the knowledge of another. And thus we are afraid of proposing any uncommon plant, being doubtful what we ought to expect from it.

Dogs mercury has been given internally, for want of knowing the natural classes ; whereas he, who is qualified to reason about the virtues of plants, will allow only the external use of this plant, and in glysters. The *cow parsnep* has been

^h I cannot help applying to this and the foregoing section two verses of that sensible old poet, œconomist, and husbandman Hesiod, tho' in a different sense from what he uses them.

Νηπιον εκ ισασιν οσω πλεον ημισυ παντος,

Ουδ' οσον εν μαλαχη τε κ' ασφοδελω μεγ' ονειαρ.

Which I shall translate for the sake of the unlearned reader. The meaning is as follows. “ Foolish man does not know
“ how much the half is more than the whole, and what
“ great benefit may be found from the plants, that grow
“ every where about us.

ranked

ranked amongst the *emollients*, although not one among all the *umbelliferous kind* that i know of, is famous for this quality. The people of America ought to give the *mitreola*, Hort. Cliff. for the bite of serpents instead of the *ophiorrhiza*; which if they were to do, they would hardly ever fail of success, if botanists be not greatly mistaken,

13.

The neglect of vulgar medicines easily to be procured. For we owe the very best of our medicines to the vulgar, who have been taught the use of them by necessity, and conceal them as secrets.

We learned the use of the *mezereon* in the cancer from the countrey people. The *noble liverwort* is reckoned a specific in hypochondriac affections by the Gothlanders. The *linnaea* is commonly used by the Ostrobothnians in gouty pains. The common people use *pepper* oftentimes very injudiciously in acute distempers; in eruptive fevers under certain circumstances very rightly. The countrey people taught us the vertues of the *thrush-moss* for sore throats; of the *hop*
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in dislocations ; and of the *tremella*, Flor. Suec. 1017. for fixed pains in the joynts. They also chew, and blow the fumes of *garlic* into infants to assuage their gripes ; or bruise, and apply it to the navel by way of poultice¹.

14.

The neglect of travelling out of Europe. Which would afford us an opportunity of knowing plants, familiar to foreign nations. And I see not why we should be ashamed of learning any thing useful from Barbarians.

It is not long ago that some botanists, who went to America, discovered to us those excellent medicines, the *great water-dock* in the worst scorbutic cases ; the *monarda* in intermittents ; the *collinsonia* in the colics of lying-in women ; the *lobelia*, the *ceanothus*, the *diervilla* in venereal cases ; the *senega root* and *opbiorrhiza* against the bite of serpents and burning fevers. The celebrated Kalm very lately let us know,

¹ Ullua observes that some diseases at Carthage are become fatal, which formerly were not so. Which he attributes to the neglect of the Indian remedies. For he says the old women even now sometimes cure the *chapetonade*, which is one of the distempers he mentions, and formerly never failed to cure it.

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that the *water avens* is looked on as a succedaneum to the *bark* by the people of Canada. The *water figwort* that corrects *fenna*; the *bark*, &c. were communicated by the Barbarians.

15.

The neglect of reading botanical writers, especially those, who in these latter times have faithfully set forth what they knew, by certain experiments concerning the virtues of plants.

Of this kind are Rheede, Sloane, Feuilleè, &c. The use of the *coris* is unknown to most people, who have not seen what Shaw says on that subject. The virtues of the stalks of the *bitter-sweet* purifying the blood were a secret, till our president brought them to light. Before him the apothecaries gave only the *garden night-shade*, or the leaves of the *bitter-sweet*, yet few here have found any good effect from them; as we have rarely given this remedy hitherto in sufficient doses. The *rest-harrow* is seldom prescribed, because physicians have not learned its virtues in the Hungarian fever from Scyller. The antients recommended the *cot-*
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ton-thistle in cancerous cases ; but from neglect of reading the antients, this specific is almost forgot.

16.

Neglect of a method in exhibiting medicines. For instance, physicians expect those virtues from a dried plant, or in a decoction, which is not to be found but in the fresh plant, or from its expressed juice. Hence it may justly be expected from apothecaries, that they set about cultivating plants ; that such, as ought to be used fresh, may be had daily from their gardens.

The *hedge hyssop*, when fresh, purges very smartly and vomits ; when old it produces no effect at all. The diuretic virtue of our *water flag*, which is very considerable, when the plant is fresh, intirely goes off, when it is kept long. Therefore we ought to expect this virtue from the expressed juice, and not from a decoction of it. The *stone crop*, when dry, has none of that efficacy in the scurvy, which is found in it, when fresh. The same may be said of the *boufe-leek*, the juice of which is celebrated by the Hottentots. The *radish*, the *scurvy-grass*, the *horse radish*, the *garden, water,* and

and *Indian crests*, and the *all-sawce*, ought to be sold in the shops fresh, and not dried; in order to be of any service in the scurvy. The *recent* root of the *rose-wort* is vastly superior to the *dry* in head-achs. Besides it ought carefully to be considered in what part of a plant its vertue resides. Thus it is the *juice* of the *poppy*, that spreads over the brain, as it were, a *Lethan drowfiness*; and not the *seeds*, for these are eatable. The sagacity of the moderns has reduced the immense number of distilled waters to a very small list.

17.

Neglect in cultivating plants. Hence apothecaries are necessitated to sell plants which they have had by them many years, and which have lost all their virtues.

The *spikenard* is more durable, perhaps than any other plant; for it will keep its fragrance above an age, as appears by *Burserus's Herbarium*. But other plants are very different in this respect. e. g. the root of *ginseng*, tho' a great restorative, being so very costly, is seldom prescribed; and when it is, it generally has lost its properties thro' age. For which reason we ought to
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contrive methods of cultivating it ourselves. Instead of the leaves of the true *marum*, which has not its equal in art, or nature, the mouldy stalks of it are generally found in apothecaries shops. But we would not be understood as if in all cases we prefer the cultivated plants to the wild ones. On the contrary the *vipers grass*, the *goats beard*, the *succory* from the fields are superior to those which the industry of the gardener has rendered more delicate; on account of the medicinal bitter, which is wanting in their cultivated state. See a catalogue of such plants as may be raised with us in Linn. Mat. Med. p. 212.

18.

The ignorance of physicians and apothecaries in relation to our own plants. From whence it happens that they are obliged to procure plants from abroad, which may be had at home.

Thus our people buy the root of the *rosewort* and root and seeds of the *garden angelica* collected by the Norwegians on our alps, and sold by them to foreigners. For the rest see a catalogue of such plants, as are natives of our countrey, in Mat. Med. above cited, p. 210. If a purge or any
other

other slight medicine is prescribed to a poor countrey fellow, it must be the produce of the Indies, so that they cannot afford to purchase it. Hence people abhor the thoughts of employing a physician or an apothecary.

19.

The ignorance of many forreign plants. Hence we are uncertain whether those which are brought to us be genuine or spurious; and hence also their genera being unknown, we are uncertain about their vertues.

To this head may be referred the *sea lavender*, the *myrobalan*, the *starry anniseed*, the *balsam of Copaiva*, the *balsam of Peru*, the *gum animæ*, *caraunæ*, *elemi*, the *gum rofins* of *myrrh*, *bdellium*, *sagapenum*, the *aloes wood*, *calambac*^k.

20.

The usual custom in apothecaries shops of providing only drugs of quick sale. Thus they will not procure some whose vertues are now-a-days well known, for fear they should lye up-

* Hence appears one of the advantages amongst many others that may arise from the voyages of the disciples of Linæus into the remotest parts of America, and Asia, from whence many of our drugs come.

on their hands. It is the business therefore of the physician who has any regard for his own reputation, and the patient's welfare, to require the apothecary to procure such plants, as he thinks may be usefull.

Simorouba an excellent remedy in the dysentery, the *senega root* in venomous bites, the *profluvii cortex* in the diarrhæa, the *camphorata* in the green sickness, the *auricularia* in deafness, the *Peragua* in the diabetes, the *south-sea tea* in the small-pox, the *serpentinum radix* against venomous bites, the *wild flax*, a very usefull purge, are neglected. The juice of the *hypocistis*, and *fungus melitensis*, altho' powerful medicines in hæmorrhages, and the *herba dysenterica*¹, which is named so from its peculiar vertues, have not yet got a place amongst our officinals.

21.

Want of care in gathering simples at a proper time, and keeping them, when gathered, in a proper manner.

¹ I suppose the *Inula dissenterica* L. *Conyza Media*. R. 174. is here meant; as i find this note upon it in Fl. Suec. edit. 2. 'General Keith told me that the Russians, when 'extremely reduced by the bloody flux, in their expedition 'into Persia, were restored to health by this plant.'

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The root of the *avens*, unless gathered in the beginning of the spring, before the sap by nourishing, and pushing out the leaves has wasted its aromatic vertue, will by no means answer what may be justly expected from it. *Rhubarb* ought not to be brought into an apothecary's shop under ten years from the time of its gathering. The flowers of the *St. John's wort* ought to be gathered before they are full blown, that their balsamic vertue may be preserved. The root of the *angelica* is good for nothing unless it be gathered in the winter. *Sloes* ought to be gathered before they are ripe, and the juice pressed out of them in this state, i. e. before the harshness is softened by the frost, if it be designed for an astringent. *Marum* ought to be kept in vessels well closed, lest the volatile part, in which its vertue resides, should evaporate.

— Still an ample field remains,
But not for me, to others i give way,
Who choose a longer course.

AS i do not pretend to understand the subject of this piece, and therefore cannot say how far the obstacles to the advancement of physic charged upon the Swedes subsist in this countrey, or whether all those obstacles, which the author has mentioned, be real or not, my sole motive for translating it was to draw it out of that obscurity in which it was buried amongst many other pieces, relating to curiosities of natural history. I think i may be allowed to say a piece is buried in obscurity, which is only known to a few, who happen to be in the way where such curiosities are talked of; and an attempt to spread it over the nation cannot but be right, if the doctrine be solid, and affects our practitioners.

Tho' as i said i do not pretend to understand the subject of this piece; yet i hope the learned reader will excuse me, if i add one obstacle more to the foregoing list: it is *the notion which has and i believe still does prevail amongst some physicians, that the doctrine of specifics is groundless, and took its rise merely from ignorance in natural philosophy.* I will not undertake to treat this subject, as the importance of it deserves; and therefore shall
refer

refer those who choose to look farther into this affair, to a very curious and ingenious book published not many years ago by doctor Martyn, entitled, *Essays Philosophical and Medical*. The reader may perhaps find there sufficient reasons to incline him to lay some stress on the old-fashioned doctrine concerning the peculiar virtues of some medicines preferably to others, seemingly of the same intention. I will add that the phænomena of chemistry give continual proofs of the reality of this doctrine, and afford so many instances of it, that were i so inclined, i could easily fill some pages with them out of Mr. Boyle and other authors of credit. Ray in his history of plants, p. 49. cites some very curious observations of this tendency from Grew, which are well worth the consideration of physicians. Upon the whole i cannot help thinking that the want of true and genuine philosophy ought rather to be imputed to those who deny, than to those who maintain the doctrine of specifics; and that we might as well undertake to open all locks with one key, as purge all humors with one medicine.

THE
CALENDAR
OF
FLORA,
SWEDISH and ENGLISH.

Made in the YEAR 1755.

Φραζεας δ' ευτ' αν φωνην γερανυ επακυσης, &c.

Ημος κοκυξ κοκυζει, &c.

Ημος δε σκολυμος τ' ανθει η ηχετα τετλιξ, &c.

Ημος δη το πρωτον, οσοντ' επιβασα κορωνη.

Hesiod.

ABSOLVENT POSTERI.

TO THE
RIGHT HONOURABLE
THE
Lord Viscount BARRINGTON,
SECRETARY AT WAR.

MY LORD,

I Embrace with great pleasure the liberty you allow me of dedicating the following pieces to your Lordship. For tho' i must not presume to speak all i feel on this occasion ; yet i hope i may without offence, take notice of that most amiable and benevolent disposition, which makes you delight in assisting those, who are incapable of making any return. This is the least that can be said by one, who is himself of that number, and who is desirous to express in a public manner his sincere gratitude and respect. I am,

MY LORD,

YOUR LORDSHIP'S MUCH OBLIGED
AND VERY HUMBLE SERVANT,
BENJ. STILLINGFLEET.

P R E F A C E.

IN my notes on those treatises selected out of the *Amœnitates Academicæ*, which i published not long ago, i marked the day of the month on which certain trees leaved in the year 1755; and likewise mentioned some co-incidences of the coming of birds, and the flowering of plants in this and other countries. The instances i there gave were but few, as i could then find no more parallel observations made in other countries to compare mine with. Since that time another volume of the *Amœn. Academ.* is come out, in which is a small treatise entitled, the *Calendar of Flora*. This treatise contains an account of the leafing, flowering, &c. of a great number of plants, as also of the departure and return of birds. As these observations happen to be made the very same year in which mine were, and as they are the first of the kind perhaps that ever were made, i was induced to look over my papers again, which i had thrown by as of no consequence; thinking that in these circumstances some use ought to be made of them, as they might prove entertaining at least, if not instructive to those whose genius leads them to curiosities of this kind. I am very sensible how small the number of such persons is, but i am contented to write for those few, nay, indeed i write because they are so few, being willing as far as lies in my power to increase their number.

But it may be asked perhaps by some, even after they have considered all that is said on this subject in the introduction to the following *Swedish Calendar*, and in the piece *De Vernatione Arbo-*

Arborum, why endeavor to increase their number? Are there not idle people enough already? What signifies whether such a plant be in blow or in leaf at the same time with some others; or when such a bird comes or goes; sings or is silent? If we hear the bird sing, and know for what purposes the plant is useful, we know all that is necessary; every thing beyond that is but the wish, or rather dream of enthusiasm, which wants to give an air of importance to its favorite subject. This perhaps may be said by some; but the same way of reasoning applied to other things will shew, that it may possibly be wrong. For instance, the sea swells twice in 24 hours, and the moon passes thro' the meridian circle as often in the same time. Now should it be said, that if we know each of these truths separately it is enough; and that to know farther what relation in point of time one of these phænomena has to the other, is nothing to the purpose; i believe such an assertion would at this time appear absurd, however it might have passed in ignorant ages. I think we may assert universally, that whenever two things, however disparate in their nature, constantly accompany one another, they are both actuated and influenced by the same cause. Now that cause may probably operate on other things that lye within the reach of our powers, and depend on our determination. Thus that constitution of the air, which causes the cuckow to appear about the time, when the fig-tree puts forth its fruit, may indicate the properest season to sow some of our most useful seeds, or do some other work which it imports us to do at a right time; and that time may not be according

according to certain calendar days, but according to a hitherto unobserved calendar, which varies several weeks in different years. I do not absolutely assert, that we can come to make use of such a calendar, but i desire that others will not assert the contrary at present, but leave this affair to be decided by the only proper way, which certainly must be experience.

We know from Hesiod, that husbandry was in part regulated by the blowing of plants, and the coming or going of birds; and most probably it had been in use long before his time, as astronomy was then in its infancy*; but when artificial calendars came into vogue the natural calendar seems to have been totally neglected, for i find no traces of it after his time, whether for good and sufficient reasons i pretend not to determine. That it was laid aside before the time of Aristophanes we have a positive proof in his *Aves*, where he makes Pisthetairus say, ‘ Formerly the kite governed the Græcians, which according to the explication of the scholiast means, that formerly the appearance of the kite was looked on as a sign of spring. He says afterwards, that the cuckoo formerly governed all Ægypt and Phœnicia, because when that bird appeared they judged it was time for wheat and barley harvest.’

I shall make no farther mention at present of the use of plants in directing the husbandman, but take this opportunity of making a digression

* Hesiod himself was one of the earliest of the Greek astronomers. He lived, according to Sir Isaac Newton, about 70 years after Chiron, who formed the constellations for the use of the Argonauts; and from Hesiod the gross and coarse method of astronomy was called the Hesiodic method.

about birds in relation to their prognostic nature. Henceforward then, i. e. from the time of Hesiod, they seem to have been looked upon as no longer capable of directing the husbandman in his rural affairs, but they did not however lose their influence and dignity; nay, on the contrary, they seem to have gained daily a more than ordinary, and even wonderful authority, till at last no affair of consequence, either of private or public concern, was undertaken without consulting them. They were looked upon as the interpreters of the gods, and those who were qualified to understand their oracles were held among the chief men in the Greek and Roman states, and became the assessors of kings, and even of Jupiter himself*. However absurd such an institution as a college of augurs may appear in our eyes, yet like all other extravagant institutions, it had in part its origin from nature: When men considered the wonderful migration of birds, how they disappeared at once, and appeared again at stated times, and could give no guess where they went, it was almost natural to suppose, that they retired somewhere out of the sphere of this earth, and perhaps approached the ætherial regions, where they might converse with the gods, and thence be enabled to predict events. This i say was almost natural for a superstitious people to imagine, at least to believe,

* Jovi optimo maximo se consiliarum atque administrum datum meminerit augur. Cicero.

Lacedæmonii reges augurem assessorem habuerunt. Id.

Aves internuntie Jovis. Id.

Sacerdotum collegium vel nomen solenne. Plin. Nat. Hist. speaking of the augurs.

as soon as some impostor was impudent enough to assert it. Add to this, that the disposition in some birds to imitate the human voice must contribute much to the confirmation of such a doctrine. This institution of augury seems to have been much more antient than that of aruspicy; for we find many instances of the former in Homer, but not a single one of the latter that i know of; though frequent mention is made of sacrifices in that author. From the whole of what i have observed, i should be apt to think that natural augury gave rise to religious augury, and this to aruspicy, as the mind of man makes a very easy transition from a little truth to a great deal of error.

A passage in Aristophanes gave me the hint for what i have been saying. In the comedy of the *Birds* he makes one of them say thus: ‘The
 ‘ greatest blessings which can happen to you
 ‘ mortals are derived from us; first we shew you
 ‘ the seasons, viz. spring, winter, autumn. The
 ‘ *crane* points out the time for sowing, when she
 ‘ flies with her warning notes into Ægypt; she
 ‘ bids the sailer hang up his rudder and take his
 ‘ rest, and every prudent man provide himself
 ‘ with winter garments. Next the *kite* appear-
 ‘ ing, proclaims another season, viz. when it is
 ‘ time to shear your sheep. After that the *swal-*
 ‘ *low* informs you when it is time to put on sum-
 ‘ mer cloaths. We are to you, adds the chorus,
 ‘ Ammon, Dodona, Apollo; for after consult-
 ‘ ing us you undertake every thing; merchandize,
 ‘ purchases, marriages, &c. Are we not then to
 ‘ you on the footing of Apollo, &c.’ Now it
 seems not improbable, that the same transition

was

was made in the speculations of men, which appears in the poet's words, and that they were easily induced to think, that the surprising foresight of birds, as to the time of migration, indicated something of a divine nature in them; which opinion Virgil, as an Epicurean, thinks fit to enter his protest against; when he says,

*Haud equidem credo quia sit divinitus illis
Ingenium.*

But to return to Aristophanes. The first part of the chorus from whence the afore-cited passage is taken, seems with all its wildness to contain the fabulous cant, which the augurs made use of in order to account for their impudent impositions on mankind. It sets out with a cosmogony, and says, that in the beginning were Chaos, and Night, and Erebus, and Tartarus. That there was neither water, nor air, nor sky; that Night laid an egg, from whence, after a time, Love arose. That Love, in conjunction with Erebus, produced the bird kind, and that they were the first of the immortal race, &c.

With this passage in Aristophanes, the account of the oracle of Dodona seems to agree. This oracle was the oldest in Greece, and there a *dove* prophesied, according to the concurrent testimony of history; but according to the explication of Herodotus, this strange opinion arose from hence, that the Theban priestess, who was stolen by the Phœnicians, and carried into Greece, was called a *dove*, because being a barbarian, she seemed to the Dodoneans to chatter like a bird, till she had learned the Greek language, and then she was said to speak with a human voice. This
expli-

explication seems to me extremely forced, and every thing is much better accounted for by supposing, that at Dodona natural augury was first changed into religious augury; for there the oaks also prophesied; which plainly shews the first state of religious augury, when it had not wholly put off its antient form, but like the monsters in Ovid's *Metamorphoses*, itill retained enough of it to convince us what it had once been. That Dodona was one of the first places where augury was practised, is highly probable; for it is mentioned by Homer as an oracle of established reputation at the time of the Trojan war: now Pliny tells us, that Tiresias invented augury and aruspicy; and that he was reputed an augur appears by Sophocles in the *Œdipus Tyrannus*, where he is introduced saying thus to Tiresias, 'If you have received any information concerning the death of Laius from the birds, or by other means, do not envy it us.' Tiresias therefore, according to Sophocles, lived in the time of Laius; and Laius, according to Sir Isaac Newton, lived not 80 years before the taking of Troy.

I will here subjoin an account of what has been observed about the disappearance of birds, which will serve to confirm what i said above concerning the effect, which that phænomenon might not improbably have on the minds of men; and give room for the superstitious impostures that arose from thence. Aristotle has a chapter on that subject; wherein he says, 'that many birds, and not a few, as some imagine, hide themselves in holes;' he then enumerates the *swallow*, the *kite*, the *thrush*, the *starling*, the *owl*, the *crane*,
 2 the

the *turtle*, the *blackbird*, and the *lark*, as certainly hiding themselves; which shews how little was known of their real state in his days; nay, so much was he puzzled about this subject, that in another place he supposes some of the birds to be changed in their form and voice at different seasons. Thus he says, that the *redstart* changes into the *robin redbreast*; and Gesner gives this reason for Aristotle's falling into this opinion, that during the summer the *robin redbreast* lives in desert places, and comes towards towns and houses in the autumn, when the *redstart* disappears. Again Aristotle says, that the *black cap* changes into a *beccafigo*, which last appears, as Gesner observes, about autumn, when the figs are ripe, and the former after the autumn. It is true Aristotle mentions some kinds of birds which go to warmer climates when they disappear, which is a proof that their migrations were not wholly unknown in those days; and indeed the poems of Homer prove that they were in part known much earlier. Nor could it happen otherwise, when the inquisitive genius of Greece began to work, and carry men into Phœnicia and Ægypt, with a view of improving themselves in all parts of learning; where they could not avoid observing, that some birds which left Greece in the winter were found at that time in those warmer climates. But the superstition was already confirmed before this happened. Dodona was established on a foundation not to be shaken by the weak attempt of reason and experience. The birds had given good advice time out of mind, and brought many a general and a magistrate, as well as private men without number,
out

out of difficulties ; and therefore, whether they wintered in Ægypt or not, signified little ; and indeed it was only supposing them to go a little further, viz. into Æthiopia, and there they might meet Jupiter at his annual visit, μετ' αὐτοῦρας Ἀθιοπίας, and have the gift of prophecy conferred upon them, or confirmed. Agreeably to these notions we find several birds were looked upon as sacred to particular gods ; thus the owl to Minerva, the peacock to Juno, the eagle to Jupiter, the crow to Apollo whose messenger he was called as appears by Hesiod.

Some will be apt to think that i have dwelt much longer upon this subject than it deserved ; but i cannot help thinking, that even the infirmities of the human mind, especially such as have like this prevailed amongst the most ingenious and sagacious people we read of, and for a long course of time influenced their most serious concerns, ought to be looked upon as not below our notice.

It may seem wonderful to some, that naturalists have been so long without being able to determine any thing certain about the state of several birds when they disappear. The best writers have given it as their opinion, that *swallows* lye under water all winter ; one of the latest ornithologists, a writer of great character, falls into this opinion, and the author of the following Calendar adopts it ; and indeed till Mons^r. Adanson cleared up this point, it must appear a problematical point to any man. But though the migration of this bird is at last determined, yet what becomes of the *nightingale*, the *cuckow*, the *goat-sucker*, and several others, is still undecided.

R

Nor

Nor is this wonderful, though it may seem so; for the generality of mankind, and especially those who travel merely for the sake of a livelihood, or a fortune, are so little solicitous about things of this kind, that the air might be filled with *swallows* in winter without their observing it, as was plainly the case at Senegal.

The number of birds that disappear in this kingdom is much greater than is generally imagined; especially if we reckon amongst them the birds which shift quarters at different seasons, but do not cross the seas. I shall not attempt to give a list of them, but recommend it to the curious, who live in the countrey the year round to watch them more narrowly, than they have hitherto been. Linnæus says, that most of that genus of birds, which he calls *motacillæ*, i. e. *those small birds, which have a beak subulated and strait, with chaps nearly equal, nostrils of a pointed oval form, and tongue jaggedly indented*, live upon insects and not grain; and therefore migrate from the northern to the southern parts towards winter; but it appears, that many birds migrate not only in Sweden, but in Greece and other climates, that live with us all the year round.

It is possible, that after all i have said, tending to revive natural augury, and after all the necessary observations shall have been registred, that no use can be made of it; but i am certain, that as long as men have ears and eyes, they must think that one of the greatest delights of the countrey, especially during the spring months, is owing to the lively motions, beautiful shapes and colours, and melodious notes of birds, which
will

will afford more pleasure, as they are more observed; and therefore, i am not surpris'd, that Peter the Great of Muscovy did not think it beneath his attention to endeavor to enliven his new seat of empire, by sending for colonies of them from other parts, as they were scarce where he resided.

I will finish this digression with a reflection that occurs to me on the different fates of natural and religious augury. The first was simple, unattended with any of those circumstances that are apt to rouse the passions of man; and therefore, tho' likely to prove useful, if pursued with proper diligence, fell into neglect. The latter was complicated, applying itself to some of the strongest passions in man, and therefore, though unlikely to a serious mind, to have the least foundation in truth, or ever to be useful, was encouraged and adorned with all the pomp that a superstitious people could invent in honor of a flattering, and therefore favorite art.

I shall now come to some points that more immediately relate to the following Calendars.

1. I have retained the Linnæan names of every plant, and animal in the Swedish Calendar; and have added the English names to the plants taken from Ray's Synopsis, and his history, with no small trouble, as any one will easily believe who has done the like*. The numbers which follow the English names refer to the above-mentioned books with an H. to distinguish the history. The

* This trouble we shall for the future be relieved from, when that accurate and skilful botanist, Mr. Hudson, has published his *Flora Anglica*, which is now in the press.

numbers after the English names of animals refer either to his *Historia Avium*, or *Piscium*, according to the subject†. I chose to refer to Ray, as well as barely give the English names, for the ease and satisfaction of such as put a due value on that inestimable writer, whose works do honor to our nation, as a late disciple of the great Swedish naturalist justly observes. I cannot help saying farther upon this occasion, that no writer till his time ever advanced all the branches of natural history so much as that sagacious, accurate, and diligent English observer, whose systematical spirit threw a light on every thing he undertook, and contributed not a little to those great and wonderful improvements, which have been since introduced.

2. I have omitted most of the plants which are not natives of England; both because it is not easy to find English names for them which have any authority, and because i had scarcely any observations in my own Calendar, but on such plants as are native. Some foreign ones however i have retained, particularly such as are common in almost every garden; and such as are marked in the Calendar, as more than ordinary prognostic. These last are printed in large characters.

3. I have retained the division of months according to budding, leafing, flowering, &c. tho' i could not imitate this method in my own Calendar for want of more experience; but i am

† Some perhaps may think that i need not have referred to Ray for birds so well known as several mentioned in the Calendars; but the want of this caution in many authors, has produced great confusion and doubt about the things meant in every branch of natural history.

convinced

convinced that this method marks more precisely when we may expect the flowering of any plant, or the return of any bird, &c. than the bare mention of the day of a common calendar month, and at the same time marks it more universally. Thus, when Aristotle says*, That the nightingale sings continually day and night for fifteen days about the time when the young leaves begin to expand and thicken the woods, he not only marks a time, when they might expect to hear the nightingale in Greece, but in every other country; for thus it happens in Sweden and England, as may be seen in the following Calendars; whereas if he had said, it appeared in such a day of the month, it would bear true perhaps for that year only; and in fact we find in the old almanacks the same author marking days very distant from one another, for the appearance of the same birds, and thus it must be likewise in relation to plants.

Thus far for the Swedish Calendar. As to my own, 1st. i have marked every circumstance down as i found it in my journal, and hope the learned reader will pardon any mistakes which might happen, either from want of judgment or attention. It is possible, that i might put down some plants as first being in bud, or flower, or

* His words are *ὅταν το οὄρος ᾗδῃ δασυνῇται*. i. e. when the mountain is thickening, where it is certain the word *mountain* is used for the trees which generally grow upon it. Thus Homer applies the word *σκιοῦντα* to *κρεα* for that reason, *Iliad*. A. 157. and Eustathius upon the place says, *ἴσμεν δὲ ὅτι, σκιοῦντα μὲν, ὅτι τὰ παρρηκολεθύντος, λεγεί. τὰ δασέα καὶ σκιάς αποτελεστικά δια τοῦ τῆς ὕλης λασίον.*

Pliny translates this passage, *densante se frondium germinare.*

leaf, because i happened then first to observe them, or they might be in those states some time before in some place where i happened not to go.

2. I wanted such a guide as the ingenious author of the Swedish Calendar. My observations then perhaps might have been less unworthy of the public, as they would have been better directed to a particular purpose; but now the reader must expect to find in it all the imperfections that generally accompany first attempts of any kind.

3. I have caused all the prognostic plants, which are mentioned in my Calendar, to be printed in large letters as in the Swedish. The other marks i shall explain in a page by itself, for the more easy recurring to it.

4. These two Calendars would perhaps upon comparison have furnished me with some observations, had i been able to find time sufficient for that purpose; but a strong desire to communicate them to the public early in the year, that others might be induced to keep journals of the same kind, determined me to send them out in this naked condition; and the more so, as i am assured on very good authority, that such journals will be kept in Sweden, Germany, Italy, and France, the next year; and i think it would be pity, that an opportunity should be lost of making so curious a comparison between these different climates, and which perhaps may not occur again, or at least not for many years.

5. The observations on heat and cold were made with a thermometer, marked in a way peculiar to myself. The degrees are those of Fahrenheit, which i chose as being in common use,
but

but instead of 32 i have made 0 the freezing point. This method is more simple, natural, and uniform, and conveys a more distinct idea to the mind. To this scale i have reduced the Swedish author's observations, as well as those of Dr. Hales, taken from his *Vegetable Statics*; who i am pleased to find has made use of the method above-mentioned, in his late works, and i wonder it is not universally adopted. The degrees below 0 i have marked thus,—1.—2.—3, &c.

6. My botanical observations were made on plants growing in the fields chiefly; the Swedish plants growing in the Upsal garden; which method is best, where either is in our power, i cannot determine. There are conveniences and inconveniences attending each; but there is one great convenience visibly on the side of the garden; which is, that the plants lye within a small compass, and therefore may be looked over more surely and regularly every day.

7. I once designed to place the two Calendars over-against one another, in opposite pages, part by part, according to the days of the month, but upon consideration i found, the climates being so different, that there would be great vacancies in many of the pages; at the same time that the same plants would be in different pages, and the bulk of the book would be increased without any advantage to the reader; i therefore thought it would be better to make an index, which will furnish an easy method to the curious of comparing the two climates.

8. If ever any use be made of Calendars of this kind, it must be by finding out, after a long series of observations, and publishing by itself a

list of a few regularly prognostic plants, either common in every field, if native; or, if not native, common in every garden. For it must be noted, that many plants will blow even in the depth of winter, if the weather be mild. This is the case of *dandelion*, *chickweed*, *shepherd's purse*, *daisy*, &c. As for other precautions, I will refer the reader to the piece concerning the leafing of trees in the Amæn. Academ.

This Calendar was made at the hospitable seat of my very worthy and ingenious friend Mr. Marsham, who has likewise made observations of this kind, and lately communicated to the world his curious observations on the growth of trees. All the countrey about is a dead flat; on one side is a barren black heath, on the other a light sandy loam; partly tilled, partly pasture land sheltered with very fine groves.

THE
CALENDAR of FLORA.

By ALEXAND. MAL. BERGER,

Upsal 1755. Latitude 59. 51. $\frac{1}{2}$

Poma dat autumnus, formosa est messibus æstas,
Ver præbet flores.

OVID.

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INTRODUCTION.

BEFORE i set forth the Calendar of Flora, or the delights of the year, arising from mere sublunary things according to its progress, and that from observations made in the climate of Upsal, ann. 1755. i think it necessary to say something by way of introduction. Time moves on slowly; every thing is in progression and motion, and has its allotted time, as the wisest of men Solomon observes; to which purpose Virgil says, *Stat sua cuique dies*.

Astronomers have exerted all their power to measure time. To them we owe the accurate divisions of it; for they by observing the course and motion of the celestial bodies, have been at last enabled to reduce it to stated periods, and to divide it in such a manner into years, months, weeks and days, that we have calendars constructed for common use, as a rule by which to observe and number its equal parts.

As the stars radiate, shine, and adorn the celestial regions of the summer months, so flowers beautify and illuminate the earth with a wonderful variety of bright and delightful colors. Thus, according to the stile of the chymists, that which is above is as that which is below.

How much time soever and labor botanists have bestowed for many ages back, in order to know the names, nature and vertues of plants, they have not hitherto arrived at that degree of perfection, as to be able to equal the success of astronomers, in noting the properties and phaenomena of each of them.

Every

Every flower has its appointed season. It would therefore be in vain for us to seek the spring plants in autumn, and the autumn plants in the spring. We see them at stated times emerging, stalking, flowering, fruiting, decaying. Again in another season we see others rising in their room, and that in so short a time, by so regular and constant a law, according to the direction of their natures, that it seems impossible for any one to behold this series and variety, without the highest admiration.

The sun at the same time that it raises, as it were, to life these beings, that are destitute of animal functions, brings them forth also sooner, or later, according to the nature and disposition of each, i. e. as this or that plant requires a lesser or a greater degree of heat, before it can obtain its just maturity. For as eggs, differing in species, when sit on by a hen, will not all be hatched the same day, but some sooner, some later, so neither do flowers come forth together, but at stated times, as they shall have received the degree of heat proper to their natures.

Altho' the year was formed by the Creator in such a manner, as to be divided into distinct parts, by the sun sending forth its rays equally on the surface of the earth, yet we are not therefore from thence to define and measure the summer, the quantity of ice and snow and Northern colds hindering the air from being equally soon warmed in different years; and according to the heat of the air, the seasons are advanced or retarded, and this is best known and measured by the various kinds of flowers.

Since therefore the summer season depends
upon

upon the greater or lesser degree of heat, so that flowers come forth proportionably to those different degrees, but yet in such a manner, that one species follows another in a regular order; since this is the case, i say, the seasons of the year, and particularly the summer, may easily from thence be measured; which hitherto has been a desideratum, on account of œconomical uses, in spite of all the assistance from astronomers.

Hence plants in different years often flower a month sooner or later, although, as i observed before, they still follow one another in their natural order, as far as the summer solstice; at which time they hardly ever differ in any year; and in the same manner they proceed, hasten on, or are retarded, the nearer they approach towards autumn, and the winter is farther off or nearer at hand. Now in order to determine accurately the acceleration or retardation of the winter, we must observe all the different kinds of flowers in every place, at what time they first appear, and this daily, that the order which they observe may be better ascertained.

By way of specimen i have exhibited the flowers in the same order in which they appeared the last year, 1755, in the Upsal garden. I must observe, that almost all the plants mentioned in the following calendar grew in the open air, and in the same kind of soil, which is rather low and loamy, excepting about half a score, which were gathered in the woods not far distant, and which are with difficulty raised in the garden.

I have marked the month and day all along
on

on the side of the page, not meaning that any one should thence imagine that the flowers will return every year on the same day and month, but with intent to set forth the calendar of that individual year, and that it might appear with what diligence and circumspection it was made.

In order to distinguish the cultivated plants from the wild, i have used italics for the first, and have marked the plants which appear to be most prognostic by an asterisk*.

I have besides thought fit to dispose them all into months, according to a division the aptest i could contrive; but i did not think it necessary to form equal months, as my design was not to determine days, but chiefly and indeed only the greater or lesser acceleration of summer.

Having so accurately observed the flowers, i thought fit to add the times at which the animal kingdom undergoes certain alterations, such as when birds of passage come and go, when birds of every kind lay, or hatch, or moult, when several kinds of fishes celebrate their nuptials near the sea shore, when it is sowing time, when grain flowers, ripens, &c.

By the help of such observations we may at last come to know what is to be done, or observed, every day, by the flowering of plants. But much time is required to bring this to perfection; and he who observes, must, if he means to do any thing to the purpose, live in the country, where it is much easier to see every thing that presents itself.

* Instead of an asterisk i have used great letters.

If the gentlemen of our own, or other countries, took delight in such observations, they might amuse themselves very agreeably, by giving up some of their time to things of this kind; and I am most certainly persuaded, that this so slight a sketch, gaining continually new additions, would at last produce a work of great use; as it might furnish materials for directing private œconomy, and the more so as the times for sowing of seeds, for reaping, and mowing, and for gathering fruits of various kinds, might from thence be best settled.

Gardeners might thence learn at what time of the spring, they ought to lay the roots of plants bare, when to sow their seeds, when to expose to the open air, and when to put under shelter their tender plants, and how to furnish the garden with flowering plants; so that there might be a perpetual blow all possible months of the year; thus the *lilac* follows the *cherry*, the *mock orange* follows the *lilac*, and the *late roses* follow the *mock orange*.

THE ORDER OF BLOWING OF THE BULBOUS PLANTS IN BORDERS, AND THEIR DURATION. N. B. The plants are numbered from the first day of budding, by the figures bered on the left hand, the other figures on the right hand shew the duration of their blow*.

* The meaning is this, as explained to me by Mr. Solander; suppose the *snow-drop* buds on any given day, then the *crocus* will bud the second day after it, the *hyacinth* the 12th day after it, &c.

256 INTRODUCTION.

1. Snow-drops, 1144. H. *Galanthus nivalis*, 26.
- Violet, *bulbous* 1144. H. *Leucoium vernale*, 26.
2. Crocus, *spring*, 1174. H. *Crocus vernus*, 17.
12. Hyacinth, *oriental*, 1159. H. *Hyacinthus orientalis*, 18.
20. Fumitory, *bulbous*, 975. H. 4. *Fumaria bulbosa solida*, 20.
23. Hollow-root, 975. H. 5. *Fumaria bulbosa cava*, 20.
28. Hyacinth, *grape*, 1161. 28. H. *Hyacinthus botryoides*, 19.
34. Daffodil, *English*, 371. 2. *Narcissus pseudonarcissus*, 19.
- Daffodil, *sweet*, *Narcissus odoratus*, S. N. 19.
37. Crown, *imperial*, 1105. H. *Fritillaria imperialis*, 10.
- Fritillary, *Pyrenean*, 1107. H. *Fritillaria Pyrenæica*, 14.
38. Lilly, *chequer'd*, 1106. H. *Fritillaria meleagris*, 10.
44. Tulip, 1146. H. *Tulipa Gesneriana*, 13.
47. Primrose, *peerless*, 1133. H. *Narcissus poeticus*.
50. Hyacinth, *summer*, 1160. H. *Hyacinthus amethystinus*.
15. Hyacinth, *Spanish*, 1160. 21. H. *Hyacinthus cernuus*.
59. Star of Bethlehem, 1153. 9. H. *Ornithogalum umbellatum*.
68. Lilly, *fiery*, 1110. 3, 4, 5, 7. H. *Lilium viviparum*.
69. Moly, *yellow*, 1123. 4. H. *Allium moly*.
76. Martagon of Pompony, 1114. 7. H. *Lilium Pomponium*.
79. Star of Bethlehem, *spiked*, 1151. 1. H. *Ornithogalum Pyrenæicum*. 69. Moly,

80. Corn flag, 1168. H. *Gladiolus communis*.
 81. Martagon, *common*, 1112. H. *Martagon vulgare*, 15.
 86. Martagon, *white*, 1112. *Martagon album*, 13.
 100. Lilly, *white*, 1109. H. *Lilium album*.
 111. Hyacinth, *dun-coloured*, 1160. 22. H. *Hyacinthus serotinus*.
 113. Saffron, *meadow*, 373. *Colchicum autumnale*.

When many calendars of this kind shall be made in different places and nations in the same year, it will be easy to collect from the blowing of these sorts of flowers, and from the leafing of trees, how one climate differs from another, and why plants brought from the Southern parts seldom produce fruit with us, whereas the Northern plants succeed very well. Thus at Montpelier the spring is forwarder than at Upsal by 31 days, at London by 28, at Falconia by 6; and the winter comes on as much later in those places.

Botanists and apothecaries, whose business it is to gather plants just when they are in blow, may by this means learn at what time that may be done, and need not seek in vain at an improper season, and may farther know by their garden plants, what wild ones are to be found in the fields precisely at the same time; and on the contrary.

The night frosts which so often destroy our plants, and which I imagine come to us from Lapland, may be known in the same way.

Thus the LEAD cold arising from the thaws in Lapmarck, happens at the end of the leafing season.

The BRASS cold from the snow melting in Lapland in the beginning of the fruiting season.

The IRON cold from the freezing on the Lapland alps in the middle of the sowing season.

These colds do not happen with us the same night as in Lapland, but arrive in about 8 days.

On these and such like calendars vulgar practical husbandry ought to be established; but the foundation hitherto not having been sufficiently well laid, this method is become so much out of use, that it is even looked upon as absurd and chimerical; nevertheless it may and ought to be carried so far, that no prudent œconomist will choose to be without such a guide, and the husbandman shall find it the surest way to regulate his affairs by, not to mention other particulars.

THE
CALENDAR
OF
FLORA,
SWEDISH and ENGLISH.

Made in the YEAR 1755.

THE MONTHS.

- I. Reviving winter month from Dec. 22.
to March 19.
- II. Thawing month from Mar. 19. to Apr. 12.

1. SPRING.

- III. Budding month from April 12 to May 9.
- IV. Leafing month from May 9 to May 25.
- V. Flowering month from May 25 to June 20.

2. SUMMER.

- VI. Fruiting month from June 20 to July 12.
- VII. Ripening month from July 12 to Aug. 4.
- VIII. Reaping month from Aug. 4 to Aug. 28.

3. AUTUMN.

- IX. Sowing month from Aug. 28 to Sept. 22.
- X. Shedding month from Sept. 22 to Oct. 28.
- XI. Freezing month from Oct. 28 to Nov. 5.

4. WINTER.

- XII. Dead winter month from Nov. 5 to Dec. 22.

T H E

CALENDAR of FLORA.

I. REVIVING WINTER MONTH.

From the winter solstice to the vernal æquinox.

Dec. XII.

xxii. *Butter shrinks and separates from the sides of the tub.*

xxiii. *Asp flower buds begin to open.*

Jan. I. i. *Ice on lakes begins to crack.*

ii. *Wooden walls snap in the night.*

Cold frequently extreme at this time, the greatest observed was 55.7.

iv. **Horse dung spirts.*

viii. *Epiphany rains.*

xxvi. *St. Paul's rains,*

Feb. II.

xxii. *Very cold nights often between Feb. 20 and 28, called STEEL NIGHTS.*

* Note. This was explained to me by Mr. Solander, an ingenious and learned disciple of Linnæus, now in England, who says, that horse dung, in very severe frosts, throws out particles near a foot high, and that no other dung does the like.

II. THAWING MONTH.

From the first melting of the snow to the floating of ice down the rivers.

Vere novo gelidus canis cum montibus humor
Liquitur, et zephyro putris se gleba resolvit.

VIRG.

Mar. III.

- xix. *Eves drop towards the noontide sun.*
Sallow, round leaved, flower-buds, 449.
15. *Salix caprea*, open.
- xx. *Snow melts against walls.*
LARK *begins to sing.*
- xxii. *Water flows by the walls.*
- xxv. *Roads very dirty and full of water.*

April IV.

- i. *Horse dung melts the ice.*
Moss, upright fir. *Lycopodium selago*,
106. sheds its dust.
 - iii. STONES *are loosened from the ice.*
 - vi. *Hills begin to appear, the snow being melted.*
Serpents come out of their holes.
SPIDER, water, *frisks about.* The FLY
creeps forth.
GAME, black, 53. *Tetrao tetrix.*
LAPWING, 110. *Tringa vanellus*, *returns.*
 - vii. BUTTERFLY, *nettle, Papilio urticae*, *appears in abundance.*
- Some people, says Pliny, think the appearance of the butterfly the surest sign of spring, on account of the delicacy of the animal.*

DUCK,

April IV.

vii. DUCK, tame, 145. *Anas boschas*, fits.
Wild DUCK returns.

x. An inundation of snow water.

SWAN, 37. *Anas cygnus*, and DAKER-
HEN, 58. 8. *Rallus crex*, by their ap-
pearance proclaim the spring.

RIVERS are unbound, and ice floats down.

N. B. The river at Upsal, for 70 years, has never
been frozen beyond the 19th of April, according to
the observation of O. Celsius, sen.

PIKE, 112. *Esox lucius*, spawns. This
fish gives over spawning when the frog
begins,

xi. Snow water soaks into the earth.

Subterraneous places are inundated.

FROG comes forth.

Winter shelters ought to be removed from
garden plants, that they may not be too
much drawn up.

Hot-beds for melons should be sown,

Solvitur acris hyems grata vice veris et Favonii.

HOR.

III. BUDDING MONTH.

From the return of the WHITE-WAGTAIL,
Motacilla alba, 75. 1. to the coming of the swal-
low; or from the first flower to the leafing of the
first tree, during the whole time of the flowering of
the bulbous violet.

A Favonio veris initium notant. CICERO.

April IV.

xii. Hasel-nut tree, 439. *Corylus avellana*.

S 4

COLTS-

April IV.

- xii. COLTSFOOT, 173. *Tussilago farfara*.
 xiii. Saffron, 374. *Crocus sativus*.
 VIOLET, *bulbous*, 1144. *H. Leucoium vernale*, 26.
 Snow drops, 1144. *H. Galanthus nivalis*, 26.
 WAGTAIL, *white*, 75. 1. *Motacilla alba*, *returns*.
 KESTREL, 16. 16. *Falco tinunculus*, *returns*.
 FROG, 247. *Rana temporaria*, *croaks*.
 Saffron, 374. *Crocus sativus*, 17.
 xv. Pilewort, 246. *Ranunculus ficaria*.
 Star of Bethlehem, *yellow*, 372. *Ornithogalum luteum*.
 Grass, *whitlow*, 292. *Draba verna*.
 Mezereon, 1587. *H. Daphne mezereon*.
 TURKEY hen, 51. 3. *Meleagris gallopavo*, *sits*.
 Honeyfuckle, *double*, 1490. *H. Lonicera perfoliata*.
 xvi. Liverwort, *noble*, 580. *H. Anemone hepatica*, 34.
The time for sowing barley at Upsal.
 xvii. Lilly, *yellow water*, 368. 1. *Nymphaea lutea*, *leaves emerge*.
 xix. Asp, or *trembling poplar*, 446. 3. *Populus tremula*, 13.
 Abele, 446. 2. *Populus alba*, 13.
Hot-beds to be sown from the budding of the poplar to the leafing month.
 xxi. SMELT, 66. 14. *Salmo eperlanus*, *spawns*, *at which time generally tempests and snowy weather at Upsal, and intermitting fevers very common.*

April IV.

xxi. Hellebore, *black*, 271.1. *Helleborus viridis*.

Willow, *round leaved*, 449.15. *Salix caprea*.

xxx. Crake berries, 444. *Empetrum nigrum*.

Poplar, *black*, 446. *Populus nigra*.

Bur butter, 179. *Tussilago petasitis*, 25.

May V.

i. Mercury dogs, 138.1. *Mercurialis perennis*.

Polyanthus, 1083. *Primula veris hortensis*.

iii. ANEMONE, wood, 259.1. *Anemone nemorosa*, 21.

Saxifrage, *golden*, 158.2. *Chrysosplenium alternifolium*.

Violet with throat-wort leaves, 365.8. *Viola hirta*.

Affarabacca, 158.1. *Afarum Europæum*.

Violet, *sweet*, 364.8. *Viola odorata*, 24.

Pepperwort, 304. *Lepidium petraeum*.

Fields are covered with verdure.

After the return of the WHEAT EAR*, 75.1.

Motacilla Oenanthe, there is seldom any severe frost, and therefore the peasants in Upland have this proverb; When you see the WHITE WAGTAIL you may turn your sheep into the † fields; and when you see the WHEAT EAR, you may sow your grain.

* If this bird does not quit England, it certainly shifts places. For i have observed, that about harvest time they were not to be found where there were before great plenty of them.

† The sheep are housed all winter in Sweden, as Mr. Solander informs me, who gave me the translation of the Swedish proverb in the very words here printed.

May V.

vii. Osier, 450.21. *Salix viminalis*.Bramble, 467.1. *Rubus fruticosus*, leafs.STARLING, 67.1. *Sturnus vulgaris*,
returns.viii. Moscatel, *tuberos*, 267. *Adoxa moscatellina*.*Seeds of kitchen plants to be sown. Tender plants to be taken out of the green house.*ELM TREE, 469. *Ulmus campestris*.*Snow melts even in the shade.*Diffugere nives, redeunt jam gramina campis.
Arboribusque comæ. HOR.

IV. LEAFING MONTH.

*The compleat leafing of trees from the bird cherry to the ash; from the coming of the swallow to the tulip.*Nunc herbæ rupta tellure cacumina tollunt;
Nunc tumido gemmas cortice palmes agit. OVID.

May V.

ix. SWALLOW and STORK *return*.CHERRY, BIRD, 463. *Prunus padus**. L.Filberd, 439. *Corylus avellana*. L.xi. Asp, 446.3. *Populus tremula*, *out of blow*.xii. CUCKOW, 23. *Cuculus canorus*, *sings*.

* The letter L. at the end of the lines signifies that those plants came into leaf on the days marked. All the plants besides throughout this Calendar are supposed to have flowered on the days marked, unless the contrary is expressed.

May V.

- xiii. Sorrel wood, *281. *Oxalis acetosella*.
 BIRCH TREE, 443. *Betula alba*. L.
 Barberry bulh, 465. *Berberis vulgaris*. L.
*The best time for sowing barley, and the
 seeds of of garden plants.*
 Osier, 450.21. *Salix viminalis*. L.
- xiv. Spindle tree, 468. *Euonymus Europæus*. L.
 Bear's ear, 1083. *H. Primula auricula*, 12.
 Goule, or Dutch myrtle, 443. *Myrica gale*.
 Orange, mock, 1763. *H. Philadelphus
 coronarius*. L.
 Elder, water, 460. *Viburnum opulus*. L.
 Lilac, 1763. *H. Syringa vulgaris*. L.
 Privet, 463. *Ligustrum vulgare*. L.
 Buckthorn, sea, 445. *Hippophae rham-
 noid*. L.
 Alder tree, 442. *Betula alnus*. L.
- xv. Daffodil, wild English, 371.1. *Narcissus
 pseudonarcissus*, 19.
 Roses garden.
 Elm tree, 469. *Ulmus campestris*. L.
 NIGHTINGALE, 78. *Motacilla lusci-
 nia*, returns.
 Thorn, white, 453.3. *Cratægus oxya-
 cantba*. L.
 Apple tree, 451. *Pyrus malus*. L.
 Primrose, 284. *Primula veris*, 16.
 Cherry tree, 463. *Prunus cerasus*. L.
 Thorn buck, 466. *Rhamnus catharti-
 cus*. L.
 Cinquefoil, small rough, 323. *Potentilla
 verna*, 16.
- xvi. Sallow, round leaved, 449.15. *Salix caprea*.
 L.

Beam

May V.

xvi. Beam tree, *white*, 453. *Cratægus aria*. L.
 Chesnut tree, *horse*, 1683. *Æsculus hippocastanum*. L.

Beech tree, 439. *Fagus sylvatica*. L.
 Hornbeam, 451. *Carpinus betulus*. L.
 Poplar, *black*, 446. *Populus nigra*. L.

xx. Asp, 446. *Populus tremula*. L.

xxi. Marygold, *marsh*, 272. *Caltha palustris*.
 Lime tree, 473. *Tilia Europæa*. L.
 Alder, *berry bearing*, 465. *Rhamnus frangula*. L.

Fly, dragon, *Moufet*, p.67. *Libellula*.

Salmon, 63.2. *Salmo, salar*.

Oak tree, 440. *Quercus, robur*. L.

ASH TREE, 469. *Fraxinus excelsior*. L.

xxiv. *While the ash is leafing there is scarcely any more frost : therefore green house plants ought to be brought into the open air.*

THE LEADEN NIGHTS happen before the leafing of the ash ; from that time the summer is settled.

There are very few flowers in this month ; for nature being intent on the young offspring of the bird kind, prepares abundance of flowers, against the hatching season.

V. FLOWERING MONTH.

From the first ear of rye to its blow.

From the tulip, 1146. *Tulipa Gesneriana*, to the wall pepper, 270. 5. *Sedum acre*.

It ver, et Venus, et Veneris prænuncius ante
 Pinnatus graditur zephyrus vestigia propter.

LUCRET.

* CHERRY,

May V.

- xxv. * CHERRY, BIRD, 463. *Prunus padus*.
 Currants, *black*, 456. *Ribes nigrum*.
 Jack by the hedge, 293. *Erysimum alliaria*.
 Cicely, *wild*, 207. *Chærophylum sylvestre*.
 TULIP, 1146. H. *Tulipa Gesneriana*, 13.
 Milkwort, *287. *Polygala vulgaris*.
 Lady's mantle, 158. *Alchemilla vulgaris*.
 ROCHE, 122. *Cyprinus rutilus*, *spawns*.
First ear of rye.
- xxvi. Saxifrage, *white*, 364. 6. *Saxifraga granulata*.
 Ivy, *ground*, 243. *Glechoma hederacea*.
 Goldilocks, 248. *Ranunculus auricomus*.
 Pear tree, 452. *Pyrus communis*, 14.
- xxvii. Celandine, *greater*, 309. *Chelidonium majus*.
 Cloud berries, 260. *Rubus chamæmorum*.
 Cat's foot, 181. *Gnaphalium dioicum*.
 CRANE'S BILL, 361. 18. *Geranium sylvaticum*.
 Globe flower, 272. *Trollius Europæus*.
- xxviii. Cuckow flower, 299. *Cardamine pratensis*.
*While the cuckow flower blows, the salmon goes up
 the rivers, and dragon fly comes forth*.
 Thorn, *black*, 462. *Prunus spinosa*, 10.
 Cherry tree 463. *Prunus cerasus*, 10.
 Plumb tree, 462.2,3. *Prunus domestica*.
 Pease, *wood*, 124.2. *Orobus tuberosus*.
 Plantain, *hoary*, 314.3. *Plantago media*.

* While the bird cherry flowers, happens what is called the grey weather, between the old and new moon. I am indebted to Mr. So-lander for the interpretation of this passage: it is in the original called the plenilunium cornicu n, but ought to be read interlunium.

May V.

xxx. Butterwort, *281. *Pinguicola vulgaris*.
Lilly in the valley, 264. *Convallaria Mai-*
alis, 21.

Bugle, *mountain*, 245.2. *Ajuga pyramidalis*.
Rush, *bare's tail*, 436. *Eriophorum vagi-*
natum.

Grass, *cotton*, 435. *Eriophorum polysta-*
chyon.

Honeysuckle, *dwarf*, 261. *Cornus Suecica*.
Whorts, *red*, 457. *Vaccinium vitis idæa*.

CROWFOOT, CRANE'S BILL, 361.18. *Ge-*
ranium sylvaticum, 120.

Catchfly, *red German*, 340.14. *Lychnis*
viscaria.

Germander, *wild*, 282. 11. *Veronica cha-*
mædrys.

BREAM, 116.5. *Cyprinus brama*, *spawns*.

*The bream sports while the bird cherry fades, and
the juniper begins to blow, and when this fades
the dragon fly comes out.*

Nunc frondent sylvæ, nunc formosissimus annus.

June VI.

i. Fir, *spruce*, 441. *Pinus abies*, drops its
male flower.

ii. PEIONY, 694. H. *Pæonia fl. simplici*, 10.
AVENS, PURPLE MOUNTAIN, 253. *Geum*
rivale.

Tormentil *septfoil*, 257.1. *Tormentilla*
cresta.

APPLE TREE, 451. *Pyrus malus*.

Rye in ear.

iii. Juniper tree, 444. *Juniperus communis*.

Quicken tree, 452. *Sorbus aucuparia*.

Buck-

June VI.

iii. Buckbean, 285. *Menyanthes trifoliat.* 18.

iv. Grass, *foxtail*, 396.1. *Alopecurus pratensis.*

v. Plantain, *ribwort*, 314.5. *Plantago lanceolata.*

Crane's bill, *dusky*, 361. 21. *Geranium phæum.*

vii. Orchis, *male banded*, 310.19. *Orchis latifolia.*

Gooseberry bush, 1484. *H. Ribes grossularia.*

Paris, *herb*, 264. *Paris quadrifolia.*

Trefoil, *bird's foot*, 334. 1. *Lotus corniculata.*

Bilberry bush, *great*, 457. *Vaccinium uliginosum.*

Comfrey, 230. *Symphytum officinale.*

Flax, *purging*, 362.6. *Linum catharticum.*

Columbines, 273. *Aquilegia vulgaris.*

Violet, *dame's*, 790. *H. Hesperis matronalis.*

Flora unrobed. The pear, plumb, Scotch fir and spruce out of blow.

The summer is then in its highest beauty, when Pomona, dressed as it were in her snow-white garment, celebrates her nuptials; while the tulip, narcissus and peony adorn the garden, the fresh shoots of the fir illuminate the woods, and the juniper sheds its impregnating vapour.

Christopher, *herb*, 661. *Actæa spicata.*

Grass, *melic*, 403.6. *Melica nutans.*

Bramble, *stone*, 261. *Rubus saxatilis.*

Crowfoot, *bulbous*, 247.2. *Ranunculus bulbosus.*

Hawk-

June VI.

- vii. Hawkweed; *dandelion*, 245. *Leontodon hispidum*.
- viii. Barberry, 465. *Berberis vulgaris*.
LILAC; 176. *H. Syringa vulgaris*.
The meadows glow with crowfoots.
- ix. Crane's bill, *dovefoot*, 359. 11. *Geranium molle*.
- x. Flower de luce; *yellow water*, 374. *Iris pseud-acorus*.
- xi. Crane's bill, *crowfoot*, 360. 17. *Geranium pratense*.
Bell flower, *lesser round-leaved*, 277. 5.
Campanula rotundifolia.
Camomile, *Roman*, 189. *Matricaria chamomilla*.
Cinquefoil, *shrubby*, 256. 4. *Potentilla fruticosa*.
- xii. Beam tree, *white*, 453. *Cratægus aria*.
Vetch, *kidney*, 325. 1. *Anthyllis vulneraria*.
Henbane, 274. *Hyoscyamus niger*.
- xiii. Catchfly, *white*, 340. 11. *Silene nutans*.
Avens, 253. 1, 2. *Geum urbanum*.
Adonis, *flower*, 251. *Adonis annua rubra*.
The single peony fades before the double blows, as is the case of rhubarb and rhapontic.
- xiv. Lilly, *yellow water*, 368. 1. *Nymphæa lutea*.
Orchis, *female banded*, 381. 20. *Orchis maculata*.
Robert; *herb*, 358. 6. *Geranium robertianum*.
Cinquefoil, *upright bastard*, 255. *Potentilla rupestris*.
Campion, *white*, 339. 8. *Lychnis dioica*.
Elder,

June VI.

- xiv. Elder, *water*, 460. *Viburnum opulus*.
- xv. Rose, *pimpernel*, 454.3. *Rosa spinosissima*.
 Briar, *sweet*, 454.2. *Rosa eglanteria*.
 Thorn, *buck*, 466. *Rhamnus catharticus*.
 Orchis, *lesser butterfly*, 380.18. *Orchis*
 bifolia.
- xvi. Grafs of Parnassus, 355.1. *Parnassia pa-*
 lustris.
 Grafs, *marsh goose*, 255.3. *Galium uli-*
 ginosum.
 Lilly, *white water*, 368.3. *Nymphaea alba*.
 Tansey, *wild*, 256.5. *Potentilla anserina*.
 Alder, *berry bearing*, 465.1. *Rhamnus*
 frangula.
 PEIONY, DOUBLE, 693. H. *Pæonia ple-*
 na, 13.
 Rampions, 274.4. *Campanula patula*.
 Rhapontic, 170. H. *Rheum rhaponticum*.
- xvii. Pink, *meadow*, 338. *Lychnis flos cuculi*.
 Valerian, *great wild*, 200.1. *Valeriana of-*
 ficinalis.
 Vetch, *chickling*, 320.5. *Lathyrus pa-*
 lustris.
 Daify, *great, or ox eye*, 184. *Chrysanthem-*
 um leucanthem.
- xvii. Eyebright, *284. *Euphrasia officinalis*.
 Spear wort, *lesser*, 250.7. *Ranunculus*
 flammula.
 Groundsel, 178.1. *Senecio vulgaris*.
 Thorn, *white*, 453. *Crætagus oxyacantha*.
- xviii. Lilly, *bulbous*, 1110. H. *Lilium bulbife-*
 rum to VII. 4.
 Saxifrage, *burnet*, 213.1,2. *Pimpinella*
 saxifraga.

June VI.

xviii. Tormentil *cinquefoil*, 255.2. *Potentilla argentea*.

Grass, *quaking*, 412. *Briza media*.

Nightshade, *deadly*, 265. *Atropa belladonna*.

RYE, *winter*, 388.1. *Secale hybernum*.

Winter rye flowers generally from the first blow of wall pepper, 270.5. Sedum acre, to the first blow of the rose bay willow herb, 310.1. Epilobium angustifolium, with the bulbous lilly, beginning oftentimes four days before the solstice.

VI. FRUITING MONTH.

During the whole blow of the wall pepper. From the yellow to the red day lilly.

————— *Revoluta ruebat*,
Matura jam luce dies.

VIRG.

xx. PEPPER, WALL, 207.5. *Sedum acre*.

Orchis, frog, 381.22. *Satyrium viride*.

Cistus, dwarf, 341. *Cistus helianthem*.

LILLY, YELLOW DAY, 1191. H. *Hemerocallis flava*.

Cinquefoil, marsh, 256.2. *Comarum palustre*.

xxi. *After the solstice trees scarcely grow, and therefore hedges should then be clipped. The highest degree of heat with us is hardly above 54.8. within the tropics the heat is not much above 57.6, nor below 40.8. the heat of a hatching hen between 63 and 68.4. a heat above 72 destroys the embryo.*

BRASS

June VI.

- xxi. BRASS NIGHTS *from the thaw of the highest mountains.*
- xxii. Orchis, *fly*, 379.13. *Ophrys insectifera myodes.*
 Blue bottle, 198. *Centaurea cyanus.*
 Vetch, *great tufted wood*, 322.4. *Vicia sylvatica.*
 Dropwort, 259. *Spiræa filipendula.*
 Thistle, *gentle*, 193.2. *Carduus heleniodes.*
 Loose strife, *yellow*, 283.3. *Lyfimachia thyrsiflora.*
 Self heal, 283. *Prunella vulgaris.*
 Gentian, *vernal dwarf*, 275.4. *Gentiana campestris.*
- xxiii. Mayweed, *stinking*, 185.4. *Anthemis cotula.*
 Yarrow, 183.1. *Achillea millefolium.*
 WILLOW HERB, *rose bay*, 310. *Epilobium angustifolium.*
 Moonwort, 128.1. *Osmunda lunaria.*
 Liquorice, *wild*, 326.1. *Astragalus alpinus.*
 Knapweed, *great*, 198.1. *Centaurea scabiosa.*
 Vetch, *tufted*, 322.3. *Vicia cracca.*
 Nightshade, *woody*, 265.1,2. *Solanum dulcamara.*
 Golden rod, 176.1. *Solidago virgaurea.*
 ORANGE, MOCK, 1763. H. *Philadelphus coronarius*, 14.
 Sweet-william, 991.2. H. *Dianthus barbatus.*
 POPPY, *Turkey*, *Papaver orientale*, 13.
 Flax, *perennial blue*, 362.3. *Linum perenne.*

June VI.

- xxiii. Dewberry bush, 467.3. *Rubus cæsius*.
 xxv. Nettle, *hedge*, 237. *Stachys sylvatica*.
 Spiked willow of Theophrastus, 1699.
 H. Spiræa salicifolia.
 Lilac out of blow.
 xxvi. Willow herb, *hooded*, 244.1. *Scutellaria*
 galericulata.
 Willow herb, *great smooth leaved*, 311.4.
 Epilobium montanum.
 Twayblade, 385.1. *Ophrys ovata*.
 Strawberries ripening.
 xxvii. Hawkweed, *Hungarian*, 167.17. *Hypo-*
 chæris maculata.
 Medic, *yellow*, 333.1. *Medicago falcata*.
 Parsley, *great bastard*, 219.2. *Tordylium*
 latifolium.
 xxviii. Toad flax, *yellow*, *281.1. *Antirrhinum*
 linaria.
 Grass, *sea dog*, 390.1. *Elymus arenaria*.
 Bryony, *white*, 261.1, 2. *Bryonia alba*.
 Campion, *wild purple*, 341.17. *Silene*
 armeria.
 xxix. *Marygold*, *corn*, 182.1. *Chrysanthemum*
 segetum.
 Heath, *Dutch or besom*, 471.4. *Erica*
 tetralix.
 Bilberry bush, 457.2. *Vaccinium myrtill*.
 Berries ripe.
 Pease, *everlasting*, 319.1. *Lathyrus lati-*
 folius.
 Throatwort, *little*, 277.3. *Campanula*
 glomerata.
 Feverfew, 187.1. *Matricaria parthenium*.
 PEACOCK *moults*.

Ox-eye,

June VI.

- xxix. Ox-eye, 183.1. *Anthemis tinctoria*.
 Sneezewort, 183. *Achillea ptarmica*.
 Rupturewort, 160.1. *Herniaria glabra*.
 Hawkweed, *succory-leaved*, 166.12. *Crepis biennis*.
 PINK, MAIDEN, 335.1. *Dianthus deltoides*.
 SCABIOUS, FIELD, 191.1. *Scabiosa arvensis*.
 St. John's wort, *large flowered*, 1017.1.
 H. *Hypericum ascyron*.
 Elder tree, 461.1. *Sambucus nigra*.
 Woad, 367.1. *Isatis tinctoria*, out of blow.

July VII.

- i. Willow herb, *purple spiked*, 367.1. *Lythrum salicaria*.
 Parsnep, *cow*, 205.1,2. *Heracleum sphondylium*.
 Bindweed, *small*, 275.1. *Convolvulus arvensis*.
 Knapweed, 198.2. *Centaurea nigra*.
 Mullein, *white flowered*, 287.2. *Verbascum lychnit. alba*.
 Rampions, 277.4. *Campanula ranunculus*.
 ii. Throatwort, *giant*, 276. *Campanula latifolia*.
 Asphodel, *Lancashire*, 375.1. *Anthericum ossifragum*.
 Mullein, *black*, 288.4. *Verbascum nigrum*.
 Rue, *meadow*, 203.1. *Thalictrum flavum*.
 Hellebore, *bastard*, 383.1. *Serapias hel-lebor. palustr.*
The hottest days.
 Bindweed, *great*, 275. *Convolvulus sepium*.
 Willow herb, *yellow*, 282.1. *Lyfimachia vulgaris*.

July VII.

- iv. Moneywort, 283.1. *Lyfimachia nummularia*.
- FOXGLOVE, PURPLE, 283.1. *Digitalis rubra*.
- Meadow sweet, 259.1. *Spiræa ulmaria*.
- Cockle, 338. 5. *Agrostema githago*.
- Speedwell, *spiked male*, 279.2. *Veronica spicata*.
- Grass, *soft tufted meadow*, 404.14. *Holcus lanatus*.
- Primrose, *evening or tree*, 862. *Oenothera biennis*.
- vi. Yarrow, 183.1. *Achillea millefolium*.
- BEDSTRAW, YELLOW LADY'S, 224.1. *Galium verum*.
- Agrimony, 202.1. *Agrimonia eupatoria*.
- Throatwort, *great*, 276. *Campanula trachelium*, 25.
- St. John's wort, 342.1. *Hypericum perforatum*.
- St. John's wort, *tutsan*, 343.4,5. *Hypericum hirsutum*.
- Spearwort, *great*, 250.8. *Ranunculus lingua*.
- Carrot, 218. *Daucus carota*.
- Stone crop, *yellow* 269.1. *Sedum rupestre*.
- Gladdon, *stinking*, 375.3. *Iris fetidissima*.
- Knapweed, 198.2. *Centaurea jacea*.
- Hops, 137.1. *Humulus lupulus*.
- Rest harrow, 332.1. *Ononis spinosa*.
- Parsley, *Scotch sea*, 214. *Ligusticum Scoticum*.
- vii. BRIAR, OR DOG ROSE, 454.1. *Rosa canina*.
- Rose, *white*, 1373.23. *H. Rosa alba*.
- Rose, *French*, *Rosa Gallica*.

July VII.

- vii. *The late roses now begin to blow.*
Hay harvest begins with the lime tree, clover
being out of blow, and yellow rattle or
*coxcomb, *284. shedding its seeds.*
 Burnet, 203.2. *Sanguisorba officinalis.*
 Poppy, wild, 308.1. *Papaver somniferum.*
 Sneezewort, 183.1. *Achillea ptarmica.*
 Lilly, yellow day, out of blow.
 Chervil, wild, 207.1. *Chærophyllyum syl-*
vestre, out of blow.
Barley every where in ear.
Pease ripe.
Cherries ripe.
Beginning of hay harvest.
 Motherwort, 239.1. *Leonurus cardiaca.*
 viii. Pink, Deptford, 337.1. *Dianthus armerius.*
 Orange, mock, out of blow.
Bilberries ripe,
 ix. Thistle, musk, 193.1. *Carduus nutans.*
 Burdock, 196. *Arctium lappa.*
 Horehound, base, 339.1. *Stachys Ger-*
manica.
 Hemp, 138. *Cannabis sativa.*
 351.13. *Frankenia pulverulenta.*
Red currants ripe.
 x. Mugwort, 190.1. *Artemisia vulgaris.*
 Thistle, ivy leaved sow, 162.5. *Prenanthes*
muralis.
 Marjoram, wild, 236.1. *Origanum vul-*
gare.
 Horehound, stinking, 244.1. *Ballota nigra.*
 Basil, great wild, 239. *Clinopodium vul-*
gare.
 Pine, ground, 244. *Teucrium chamæpitys.*

July VII.

- x. Betony, *water*, *283.1. *Scrophularia aquatica*.
 Nightshade, *enchanters*, 289. *Circæa canadensis*.
 Clover, 328.4. *Trifolium pratense*, *out of blow*.
 xi. Thistle, *tree sow*, 163.7. *Sonchus arvensis*.
 LIME TREE, 473.1,2,3. *Tilia Europea*,
out of blow.
 Marjoram, *wild*, 236. *Origanum vulgare*.

Festinat decurrere velox flosculus æstatis.

VII. RIPENING MONTH.

From the white stonecrop, 271.7. Sedum album, or the red day lilly, to the devil's bit, 191.3. Scabiosa succisa.

- xii. SUCCORY, WILD, 172. *Cichorium intybus*.
 Willow herb, *great hairy*, 311.2. *Epi-
 lobium hirsutum*.
 Langue de boeuf. 166.13. *Picris echi-
 cides*.
 Woodbind, 456. *Lonicera periclymenum*.
 Mallow, *vervain*, 252. *Malva alcea*.
 St. John's wort, *large flowered*, 1017. H.
Hypericum ascyron, *out of blow*.
 xiii. Fleabane, *small*, 174.2. *Inula pulicaria*.
 Pepperwort, 304.1. *Lepidium latifolium*.
 xiv. STONECROP, WHITE, 271.7. *Sedum album*,
out of blow.
 xv. Agrimony, *hemp*, 179. *Eupatorium can-
 nabinum*.

Tansy,

July VII.

xv. Tansey, 188. *Tanacetum vulgare*.

Golden rod, white, 175.1 *Erigeron canadense*.

Saw-wort, 196.1. *Secratula tinet. præalt.*

Mint, red, 232.5. *Mentha gentilis*.

Mint, long leaved horse, 234.5. *Mentha spicata*.

Pepper, wall, 270.5. *Sedum acre*, out of blow.

CUCKOW is silent.

xvi. Hawkweed, bushy, 168.3. *Hieracium umbell.*

LILLY, RED DAY, 1191.2. H. *Hemerocallis fulva*.

All the marvels of Peru, 398. H. *Mirabiles*.

The height of hay harvest.

xvii. Thistle, spear, 194.8. *Carduus lanceolatus*.

ELDER, DWARF, 461.4. *Sambucusebulus*.

xviii. Touch me not, 316.1. *Impatiens noli tangere*.

Saffron, meadow, 373.1. *Colchicum autumnale*. Leaves fall.

Teasel, wild and manured, 192.3. *Dipsacus fullonum*.

x. LILLY, WHITE, 1109. H. *Lilium candidum*.

Teasel, small wild, 192.3. *Dipsacus pilosus*.

xxi. Thistle, marsh tree sow, 163.8. *Sonchus palustris*.

xxii. Soapwort, 339.6,7. *Saponaria officinalis*.

Grass, Essex cocks foot, 393.4. *Dactylis cynosuroides*.

Knapweed, great, 198.1. *Centaurea scabiosa*.
Spikenard,

July VII.

- xxiii. Spikenard, *plowman's*, 179.1. *Conyza squarrosa*.
 xxiv. Elecampane, 176.1. *Inula belenium*.
 xxv. Fleabane, *middle*, 174.1. *Inula dysenter*.
 xxvi. Violet, *Calatkian*, 274.1. *Gentiana pneumonanthe*.
 Baum, 570. H. *Melissa officinalis*.
 xxvii. Thistle, *great soft or gentle*, 193.3. *Serratula alpin. lat.*

Aug. VIII.

- i. Chickweed, *berry bearing*, 267.1. *Cucubalus baccifer*.
 Orpine, 269.1. *Sedum telephium*.

Mirabar celerem fugitiva æstate rapinam,
 Et dum nascuntur consenuisse rosas.

VIII. REAPING MONTH.

From the devil's bit to the blow of the meadow saffron.

- iv. DEVIL'S BIT, 191.3. *Scabiosa succisa*.
Rye harvest.

Winter rye has for many years ripened with the first blow of the devil's bit, in the garden at Upsal.

BIRDS OF PASSAGE, *after having celebrated their nuptials in the vernal months, and feasted on the summer fruits, now prepare for departing.*

- vii. Rose, *French*, *Rosa Gallica*, *out of blow*.
 xiv. Wormwood, 188.1. *Artemisia campestris*.
 xvi. *Barley harvest.*
 xxvi. Lilly, *red*, *out of blow*.

* IX. SOWING MONTH.

From the first blow of the meadow saffron to the departure of the swallow.

Pomifer autumnus fruges effudit et mox
Bruma, recurrit iners.

Aug. VIII.

xxviii. SAFFRON, MEADOW, 373.1. *Colchicum autumn.*

This plant ought to admonish gardeners to put Indian plants under shelter, as the iron nights are near. The IRON NIGHTS, as they are called with us, generally happen between August 17 and 29, and destroy tender plants.

After the blow of the meadow saffron, we have storms that shake off ripe seeds.

Fern, female, 124.1. *Pteris aquilina*, grows yellow in the woods after the first cold nights.

xxxi. *A gentle frost that scarcely did any damage.*

Sept. IX.

i. Adonis flower, 251.1. *Adonis annua* ser.
Mulberry tree, 1429. H. *Morus nigra*, grows pale.

iv. Fig tree, 1431. H. *Ficus carica*, grows pale.

vi. Wormwood, sea, 188.2. *Artemisia maritima*.

Travellers joy, 258.1. *Clematis vitalba*,

xi. *The frost has destroyed southern plants.*

xii. *The frost milder.*

xiv. *Seeds to be gathered.*

* By sowing, in this place, is meant not man's but nature's.

Sept. IX.

xvii. Sampire, *golden flowered*, 174.1. *Inula crithmoid.*

*SWALLOW *goes under water.*

WAGTAIL, *white, departs.*

Nos quoque floruimus, sed flos fuit ille caducus.

X. SHEDDING MONTH.

From the first fall of the leaves of trees to the last.

xxii. Orach, *sea*, 152.8. *Artiplex maritima.*
Leaves of trees are changed, of the oak, maple, robinia caragana, elm, lime, to a yellow; of the spin-tree to a brown; of the quicken tree and sumach, to a red colour.

Leaves of the oak dry and yellow.

xxiv. || *Leaves of the maple begin to fall in the night.*

xxv. *Hear frost.*

xxvi. *Leaves of the robinia caragana fall.*

Sycamore stripped of its leaves.

Oct. X.

iv. *Cherry, bird, stripped of its leaves.*

v. *A storm.*

* Adamson in the account of his voyage to Senegal, p. 121. says, that October 1749, European swallows lodged on the vessel in which he went from Goree to Senegal, and that they are never seen there but at this time of the year, along with quails, wagtails, kites, and some other birds of passage, and do not build nests there. This testimony seems to take away all doubts about this long contested point.

|| Geminus, either from himself or Democritus, which is much the same, as Rome and Abdera were nearly in the same latitude, says that the leaves of trees began to drop the fourth of Scorpio, which answers to October 28.

Green

Oct. X.

- vi. *Green leaves of the ash fall. When they fall southern plants ought to be put under shelter.*
 - vii. *Elm is stripped.*
A storm.
Frost.
 - xii. *The leaves of the lime tree fall.*
Green houses ought to be shut.
 - xiii. *The ash tree still in leaf.*
 - xiv. *Ice.*
 - xvii. *Hazel nut tree stripped.*
 - xxv. *Abele, 446.2. Populus alba, stripped.*
 - xxvi. *Saffron, meadow, just out of blow.*
Poplar, black, stripped.
 - xxvii. *Summer ended.*
 - xxviii. *Sallows only in leaf.*
-

Vernantesque comas tristis ademit hyems.

PETRON.

XI. FREEZING MONTH.

From the last shedding of leaves to the last green plant.

Iva annua.

Nov. XI.

- ii. *Alternate snow and frost.*
- v. *Milleria quinqueflora.*
Thaw with rain.
The earth covered with snow.
Rivers are frozen.
Snow with a thaw.
Firm snow.
Thaws again.

Ditches

*Ditches filled with water.
Winter thoroughly settled.*

Heu quam cuncta abeunt celeri mortalia curfu.

XII. DECLINING WINTER MONTH.

From the last green plant to the winter solstice.

Nov. XI.

- v. *Mosses and lichens only flourish.*
Thermometer, gr. 34.2.
 - vi. *Thaws.*
 - xx. *Cold changeable weather.*
-

Quælibet orta cadunt, et finem cæpta videbunt.

THE
CALENDAR of FLORA.

By BENJAMIN STILLINGFLEET.

Made at STRATTON in NORFOLK,
Anno 1755. Latitude $52^{\circ} 45'$.

MARKS EXPLAINED.

b signifies buds swelled.

B - - - - buds beginning to open.

f - - - - flowers beginning to open

F - - - - flowers full blown.

l - - - - leaves beginning to open.

L - - - - leaves quite out.

r. p. - - - fruit nearly ripe.

R. P. - - fruit quite ripe.

E - - - - emerging out of the ground.

D - - - - flowers decayed.

T H E

CALENDAR of FLORA.

I. M O N T H.

Reviving nature seems again to breath,
As loosen'd from the cold embrace of death.

- Jan. 5. Rosemary, 515. H. *Rosmarinus officinal.* f.
 11. Honeyfuckle, 458. *Lonicera periclymenum*, l.
 23. Archangel, red, 240. 2. *Lamium purpureum*, F.
 Hazel nut tree, 439. *Corylus avellana*, f.
 Honeyfuckle, 458. *Lonicera periclymenum*, L.
 Laurustinus. 1690. H. *Viburnum tinus*, F.
 Holly, 466. *Ilex aquifolium*, f.
 26. Snow drops, 1144. H. *Galanthus nivalis*, F.
 Chickweed, 347. 6. *Alfina media*, F.
 Spurry, 351. 7. *Spergula arvensis*, F.
 Daisy, 184. *Bellis perennis*, F.
-

II. M O N T H.

Love's pleasing ferment gently now begins
To warm the flowing blood.

U'

WOOD

- Feb. 4. WOOD LARK, 69.2. *Alauda arborea*,
sings.
Elder tree, 461. *Sambucus nigra*, f.
12. ROOKS, 39.3. *Corvus frugilegus*, begin to
pair.
GEESE, 136.1. *Anas, anser*, begin to lay.
* WAGTAIL WHITE, 75.1. *Motacilla*
alba, appears.
16. THRUSH, 64.2. *Turdus musicus*, sings.
† CHAFFINCH, 88. *Fringilla cælebs*.
sings.
20. Thermometer, 11. Highest this month.
Thermometer, -2. Lowest this month.
22. PARTRIDGES, 57. *Tetrao perdix*, begin
to pair.
Hazel tree, 439. *Corylus avellana*, F.
25. Gooseberry bush, 1484. H. }
Ribes grossularia, l. } both young
Currant, red, 456.1. Ribes } plants.
rubrum, l. }
- Thermometer from the 19th to the 25th, be-
tween 0 and -1 with snow.
Wind during the latter half of the month be-
tween E. and N.

* The wagtail is said by Willughby to remain with us all the year in the severest weather. It seems to me to shift its quarters at least, if it does not go out of England. However, it is certainly a bird of passage in some countries, if we can believe Aldrovandus, the author of the Swedish Calendar, and the author of the treatise *De Migrationibus Avium*. Linnæus observes, S. N. Art. *Motacilla*, that most birds which live upon insects, and not grains, migrate.

† Linnæus says, that the female chaffinch goes to Italy alone, thro' Holland; and that the male in the spring, changing its note, foretells the summer: and Gesner, ornithol. p. 388. says that the female chaffinch disappears in Switzerland in the winter, but not the male.

III. M O N T H.

Winter still ling'ring on the verge of spring,
Retires reluctant, and from time to time
Looks back, while at his keen and chilling breath
Fair Flora sickens.

March

2. ROOKS, 39.3. *Corvus frugilegus*, begin to build.
Thermometer, 10.
4. THRUSH, 64.2. *Turdus musicus*, sings.
Thermometer, 11.
5. DOVE, RING, 62.9. *Columba palumbus*, cooes.
7. *Thermometer*, 0. Lowest this month.
11. Sallow, Salix, F.
Laurustinus, 1690. H. *Viburnum tinus*, 1.
*BEES, *Apis mellifera*, out of the hive.
Laurel, 1549. H. *Prunus laurocerasus*, 1.
Bay, 1688. H. *Laurus nobilis*, 1.
20. *Vernal equinox*.
21. Grass, scurvy, 302.1. *Cochlearia officinalis*, F.
Asp, 446.3. *Populus tremula*, F.
26. Speedwell, germander, 279.4. *Veronica agrestis*, F.
Alder, 442. *Alnus betula*, F.
28. Violet, sweet, 364.2. *Viola odorata*, F.
Parsnep, cow, 205. *Heracleum sphondylium*, E.
Pilewort, 296. *Ranunculus ficaria*, F.

* Pliny, nat. hist. lib. 11. §. 5. says, that bees do not come out of their hives before May 11. and seems to blame Aristotle for saying that they come out in the beginning of spring, i. e. March 12.

March

28. *Thermometer*, 25.50. *Highest this month*.
 29. Cherry tree, 463. *Prunus cerasus*, B.
 Currant bush, 456.1. *Ribes rubrum*, B.
 Primrose, 284.1. *Primula veris*, F.
 Yew tree, 445. *Taxus baccata*, F.
 Elder, *water*, 460. *Viburnum opulus*, B.
 Thorn, *haw*, 453.3. *Cratægus oxyacantha*,
 B.
 Larch tree, 1405. H. *Pinus larix*, B.
 Hornbeam, 451. *Carpinus ostrya*, B.
 Tansy, 188. *Tanacetum vulgare*, E.

IV. M O N T H.

----- Airs, vernal airs,
 Breathing the smell of grove and field, attune
 The trembling leaves. MILTON.

April 1. Chesnut, *horse*, 1683. *Æsculus hippocastanum*, B.

BIRCH, 443. *Betula alba*, L.

Willow, *weeping*, *Salix Babylonica*, L.

ELM TREE, 468. *Ulmus campestris*, F.

Quicken tree, 452.2. *Sorbus aucuparia*, f.

Apricot, 1533. H. *Prunus Armeniaca*, F.

Narcissus, *pale*, 371.2. *Narcissus pseudonar.*

3. Holly, 466.1. *Ilex aquifolium*, f.

Bramble, 467.1. *Rubus fruticosus*, L.

Raspberry bush, 467.4. *Rubus idæus*, L.

Currants, *red*, 456. *Ribes rubrum*, F.

Dandelion, 170.1. *Leontodon taraxicum*,
 E.

Cleavers,

- April 3. Cleavers, 225. *Galium aparine*, E.
 4. Laurustinus, 1690. *H. Viburnum tinus*, F.
 APPLE TREE, 451.1,2. *Pyrus malus*, B.
 Orpine, 269.1. *Sedum telephium*, B.
 Briar, 454.1. *Rosa canina*, L.
 6. Gooseberry, 1489. *H. Ribes grossularia*, f.
 Maple, 470.2. *Acer campestre*, B.
 Peach, 1515. *H. Amygdalus Persica*, L.
 et F.
 Apricot, 1533. *H. Malus Armeniaca*, L.
 Plumb tree, 462. *Prunus præcox*, L.
 Pear tree, 452. *Pyrus communis*, B.
 *SWALLOW, 71.2. *Hirundo urbica*,
returns.
 7. Filberd, 439. *Corylus avellana*, L.
 Sallow, *Salix*, L.
 Alder, 442.1. *Betula alnus*, l.
 Lilac, 1763. *Syringa vulgaris*, l.
 Oak, 440.1. *Quercus, robur*, f.
 Willow, *weeping*, *Salix Babylonica*, b.
 8. Juniper, 444. *Juniperus communis*, b.
 9. Lilac, 1763. *Syringa vulgaris*, b.
 Sycamore, 470. *Acer pseudoplatanus*, L.
 Wormwood, 188.1. *Artemisia absinthium*,
 E.
 † NIGHTINGALE, 78. *Motacilla lu-*
scinia, sings.

U 3

Auricula,

* According to Ptolemy, Swallows return to Ægypt about the latter end of January.

† From morn 'till eve, 'tis music all around;
 Nor dost thou, Philomel, disdain to join,
 Even in the mid-day glare, and aid the quire,
 But thy sweet song calls for an hour apart,
 When solemn Night beneath his canopy,
 Enrich'd with stars, by Silence and by Sleep

Attended,

April

9. Auricula, 1082. H. *Primula auricula*, b.
 10. Bay, 1688. H. *Laurus nobilis*, L.
 Hornbeam, 451. *Carpinus betulus*, b.
 Willow, *white*, 447.1. *Salix alba*, b.
 BEES *about the male fallows*.
 Feverfew, 187.1. *Matricaria Parthenium*,
 E.
 Dandelion, 170.1. *Leontodon taraxicum*, E.
 Hound's tongue, 226.1. *Cynoglossum*
officinale, E.
 Elm, 468. *Ulmus campestris*, 1.
 ANEMONE, *wood*, 259. *Anemone nemorosa*, F.
 Jack in the hedge, 291. *Erysimum*
alliaria, E.
 Quince tree, 1452. H. *Pyrus cydonia*, L.
 11. Elder, *water*, 460. *Viburnum opulus*, L.
 Alder, *berry bearing*, 465. *Rhamnus fran-*
gula, L.
 12. Acacia, 1719. H. *Robinia acacia*, 1.
 Mulberry tree, 1429. H. *Morus nigra*, 1.
 Lime tree, 473.1,2,3. *Tilia Europæa*, 1.
 Mercury, *dogs*, 138.1 *Mercurialis pe-*
rennis, F.
 * Elm, *wych*, 469.4. L.
 Ragweed, 177. *Senecio jacobæa*, E.

Attended, sits and nods, in awful state ;
 Or when the Moon in her refulgent car,
 Triumphant rides amidst the silver clouds,
 Tinging them as she passes, and with rays
 Of mildest lustre gilds the scene below ;
 While zephyrs bland breath thro' the thickening shade,
 With breath so gentle, and so soft, that e'en
 The poplar's trembling leaf forgets to move,
 And mimic with its sound the vernal shower ;
 Then let me sit, and listen to thy strains, &c.

Linnæus does not seem to know this species of elm.

April

13. Laburnum, 1721. *Cytisus laburnum*, f.
 Strawberry, 254. *Fragaria vesca*, F.
 Quicken tree, 452.2. *Sorbus aucuparia*, L.
 Sycamore, 470. *Acer pseudoplat.* L.
 Laurel, 1549. H. *Prunus laurocerasus*, L.
 Gooseberry bush, 1484. H. *Ribes grofsularia*, F.
 Currant bush, 456.1. *Ribes rubrum*, F.
 Mallow, 251.1. *Malva sylvestris*, E.
 Hornbeam, 451. *Carpinus betulus*, L.
14. Flixweed, 298.3. *Sisymbrium sophia*, E.
 Apple tree, 451. *Pyrus malus*, L.
 Hops, 137.1. *Humulus lupinus*, E.
 Plane tree, 1706. H. *Platanus orientalis*, b.
 Walnut tree, 438. *Juglans regia*, f.
 BITTERN, 100.11. *Ardea stellaris*, makes
 a noise.
15. Vine, 1613. *Vitis vinifera*, B.
 Turneps, 204.1. *Brassica rapa*, F.
16. Abele, 446.2. *Populus alba*, B.
 Chesnut, 138.2. H. *Fagus castanea*, B.
 Ivy, ground, 243. *Glechoma hederacea*, F.
 Fig tree, 1431. *Ficus carica*, b.
 Apricots and peaches out of blow.
 RED START, 78.5. *Motacilla Phœnicurus*, returns.
 Tulip tree, 1690. H. *Liriodendron tulipifera*, B.
 Plumb tree, 462. *Prunus domestica*, F.
 Sorrel, wood, *281.1,2. *Oxalis acetosella*, F.
 Marygold, marsh, 272. *Caltha palustris*, F.
 Laurel, spurge, 465. *Daphne laureola*, F.
17. Jack in the hedge, 291.2. *Erysimum alliaria*, F.

April

17. Willow, *white*, 447.1. *Salix alba*, L. et F.
 Cedar, 1404. H. *Pinus cedrus*, l.
 Elder, *water*, 460.1. *Viburnum opulus*, f.
 Abele, 446.2. *Populus alba*, L.
 *CUCKOW, 23. *Cuculus canorus*, *sings*.
18. Oak, 440.1. *Quercus*, *robur*, l. F.
 Thorn, *black*, 462.1. *Prunus spinosus*, B.
 Pear tree, 452. *Pyrus communis*, f.
 Mulberry tree, 1429. H. *Morus nigra*. B.
 Violet, *dog*, 364.3. *Viola canina*, F.
 Lime tree, 413.1,2,3. *Tilia Europæa*, L.
 Nightshade, 265. *Atropa belladonna*, E.
 Cherry tree, 463.1. *Prunus cerasus*, F.
 Ash tree, 469. *Fraxinus excelsior*, f.
 Maple, 470. *Acer campestre*, L.
 Broom, 474. *Spartium scoparium*, b.
 Chesnut, 138.2. *Fagus castanea*, L.
 Fir, *Scotch*, 442. *Pinus sylvestris*, b.
 Cuckow flower, 299. *Cardamine pratensis*,
20. *Thermometer*, 42. *the highest this month*.
21. Walnut-tree, 438. *Juglans regia*, L.
 Planetree, 1706. H. *Platanus orientalis*, L.
 Fir, *Weymouth*, 8. dend. *Pinus tæda*, B.
 Acacia, 1719. H. *Robinia pseudo-acacia*,
 L.
 Fig tree, 1431. H. *Ficus carica*, L.
 Wall flower, 291. *Cheiranthus cheiri*, F.
 Poplar, *black*, 446.1. *Populus nigra*, L.
 Beech tree, 439.1. *Fagus sylvatica*, L.
22. Fir, *balm of Gilead*, *Pinus balsamea*,
 l. et f.

* Aristophanes says, that when the cuckow sung the Phœnicians
 reaped wheat and barley. Vid. Aves.

April

22. *Young Apricots.*

Fir, *Scotch*, 442. *Pinus sylvestris*, f.

Ash, 469. *Fraxinus excelsior*, F. et L.

Broom, 474. *Spartium scoparium*, L.

Poplar, *Carolina*. L.

Meadow sweet, 259. *Spiræa ulmaria*, E.

Fig tree, 1431. H. *Ficus carica*, fruit formed.

Tormentil, 257.1. *Tormentilla erecta*, E.

Phyllerea, 1585. H. *Phyllerea latifolia*, F.

Thorn, *evergreen*, 1459. H. *Mespilus pyracantha*, F.

Rosemary, 515. H. *Rosmarinus officinalis*, F.

Campion, *white*, 339.8. *Lychnis dioica*, F.

Buckbean, 285.1. *Menyanthes trifol.* F.

Furze, *needle*, 476.1. *Genista Anglica*, F.

Stitchwort, 346.1. *Stellaria holostea*, F.

23. Crab tree, 451.2. *Pyrus malus sylv.* F.

Apple tree, 451.1. *Pyrus malus*, f.

Robert, *herb*, 358. *Geranium Robertian.* F.

Fieldfares, 64:3. *Turdus pilaris*, still here.

24. Broom, 474. *Spartium scoparium*, F.

Mercury, 156.15. *Chenopodium bonus henr.* F.

Yew tree, 445. *Taxus baccifera*, L.

Holly, 466.1. *Ilex aquifolium*, B.

Furze, 475. *Ulex Europæus*, l.

Agrimony, 202. *Agrimonia eupator.* E.

25. Sycamore, 470. *Acer pseudoplat.* F.

Hornbeam, 451. *Carpinus betulus*, F.

Asp, 446. *Populus tremula*, l.

Spurge, *sun*, 313.8. *Euphorbia peplus*, F.

Elder tree, 461.1. *Sambucus nigra*, f.

Nettle, 139. *Urtica dioica*, F.

April

25. Bindweed, *small*, 275.2. *Convolvulus arvensis*. E.
 Fir, *balm of Gilead*, *Pinus balsamea*, L.
 Cicely, *wild*, 207.1. *Chærophylum sylvestre*, F.
Young currants and gooseberries.
26. Plantain ribwort, 314.5. *Plantago lanceol.* F.
 Germander, *wild*, 281.11. *Veronica chamaed.* F.
 Cuckow pint, 266. *Arum maculatum*, *spatha out*.
 Holly, 466. *Ilex aquifolium*, F.
 Harebells, 373.3. *Hyacinthus nonscript.* F.
27. LILAC, 1763. H. *Syringa vulgaris*, F.
 Crane's bill, *field*, 357.2. *Geranium cucutar.* F.
 St. John's wort, 342.1. *Hypericum perforat.* E.
 Betony water, 283.1. *Scrophularia aquat.* E.
 Bryony, *white*, 261. *Bryonia alba*, E.
 Birch tree, 443.1. *Betula alba*, F.
28. Jessamine, 1599.1. H. *Jasminum officinale*, l.
 Thorn, *white*, 453.3. *Cratægus oxyacantha*, f.
 * BLACK CAP, 79.12. *Motacilla atricapilla*, *sings*.

* The black cap is a very fine singing bird, and is by some in Norfolk called the mock nightingale. Whether it be a bird of passage I cannot say.

April

28. * WHITE THROAT, 77. *Motacilla sylvia*.

Juniper, 444.1. *Juniperus communis*, f.

Raspberry bush, 467.4. *Rubus idæus*, f.

Quince tree, 1452. H. *Malus Cydon*. f.

Crowfoot, *sweet wood*, 248.1. *Ranunculus auric*. F.

29. Bugle, 245. *Ajuga reptans*, F.

Bay, 1688. H. *Laurus nobilis*, f.

Peas and beans, f.

Snow.

Chervil, *wild*, 207.1. *Chærophylum temulent*, f.

Parfneep, *cow*, 205.1. *Heracleum sphondyl*. f.

Pine, *manured*, 1398.1. H. *Pinus pinea*, f.

30. Snow.

† *Thermom.* 5, *The lowest this month.*

* I have some doubt whether this bird be the *Sylvia* of Linnæus, though the description seems to answer to Ray's, and to one of my own, which I find among my papers.

† Vernal heat, according to Dr. Hales, at a medium, is 13.25. †

V. M O N T H.

All that is sweet to smell, all that can charm
Or eye or ear, bursts forth on every side,
And crouds upon the senses.

May 1. Crosswort, 223.1. *Valantia cruciata*, F.
Avens, 253.1. *Geum urbanum*, F.
Mugwort, 191.1. *Artemisia campestris*, E.
Bay, 1688. H. *Laurus nobilis*, L.

Lilly

May 3. Lilly of the valley, 264. *Convallaria Maialis*, f.

Violet water, 285. *Hottonia palustris*, F.

4. Lettuce lambs, 201. *Valeriana locusta*, F.
Tulip tree, *Liriodendron tulipifera*, L.
Hound's tongue, 226.1. *Cynoglossum officinale*.

Cowslips, 284.3. *Primula veris*, F.

Valerian, great wild, 200.1. *Valerian officinalis*, F.

Rattle, yellow, 284.1. *Rhinanthus crista galli*, F.

Ica.

Thermom. 8. The lowest this month.

Fir, silver, buds hurt by the frost.

5. Twayblade, 385. *Ophrys ovata*, f.
Tormentil, 257. *Tormentilla erecta*, F.
Celandine, 309. *Chelidonium majus*, E.
Betony, 238.1. *Betonica officinalis*, E.

6. Oak, 440. *Quercus, robur*, F. et L.

Time for sowing barley.

Saxifrage, white, 354.6. *Saxifraga granulata*, F.

Ash, 469. *Fraxinus exelsior*, f.

Ramsons, 370.5. *Allium ursinum*, F.

Nettle, white, 240.1. *Lamium album*, F.

Quicken tree, 452.2. *Sorbus aucuparia*, F.

7. Fir, Scotch, 442. *Pinus sylvestris*, F.

8. Woodruffe, 224. *Asperula odorata*, F.

9. Chesnut tree, 1382. H. *Fagus castanea*, f.

10. Celandine, 309. *Chelidonium majus*, F.

Solomon's seal, 664. *Convallaria polygonat.* F.

Thorn, white, 453.3. *Cratægus oxyacantha*, F.

May

11. Maple, 470.2. *Acer campestre*, F.
Roses, garden, f.
12. Barberry bush, 465. *Berberis vulgaris*, F.
Chesnut, horse, 1683. H. *Æsculus hippocas*. F.
Bugloss, small wild, 227.1. *Lycopsis arvensis*, F.
13. Grass, water scorpion, 229.4. *Myosotis scorpioid*. F.
Quince tree, 1452. H. *Pyrus Cydonia*, F.
Cleavers, 225. *Galium aparine*, F.
14. Mulberry tree, 1429. H. *Morus nigra*, L.
Asp, 446.3. *Populus tremula*, l.
Crowfoot, bulbous, 247.2. *Ranunculus bulbos*. F.
Butter cups, 247. *Ranunculus repens*, F.
15. Young turkies.
Lime tree, 473. *Tilia Europæa*, f.
Milkwort, *287.1,2. *Polygala vulgaris*, F.
Crane's bill, 359.10. *Geranium molle*, F.
Walnut, 1376. H. *Juglans regia*, F.
16. Mustard, hedge, 298.4. *Erysimum officinale*, F.
20. Bryony, black, 262.1. *Tamus communis*, F.
Many oaks, and more ashes and beeches,
still without leaf.
Violet, sweet, 364.1. *Viola odora*, D.
Stitchwort, 346. *Stellaria holostea*, D.
Anemone, wood, 259.1. *Anemone nemorosa*, D.
Cuckow flower, 299.20. *Cardamine pratensis*, D.
Earth nut, 209. *Bunium*, bulbocast. F.
Mulberry tree, 1429. H. *Morus nigra*, f.
Night

May

21. Nightshade, 265. *Atropa belladonna*, f.
Rye, 288. *Secale hybernium*, in ear.
23. Pellitory of the wall, 158.1. *Parietaria officin.* F.
24. Bramble, 467. *Rubus fruticosus*, f.
25. Moneywort, 283.1. *Lythymachia nummul.* F.
Columbines, 173.1. *Aquilegia vulgar.*
F. in the woods.
26. Tanfy, wild, 256.5. *Potentilla anserina*, F.
Henbane, 274. *Hyoscyamus niger*, F.
27. Champion, white, 339.8. *Lychnis dioica*, F.
Clover, 328.6 *Trifolium pratense*, F.
28. Avens, 262.1. *Geum urbanum*, F.
Chervil, wild, 207. *Chærophylum temulent.* F.
30. Bryony, black, 262.1. *Tamus communis*, F.
Brooklime, 280.8. *Veronica beccabunga*, F.
Cuckow flower, 338. *Lychnis flos cuculi*, F.
Cresses, water, 300.1. *Sisymbrium nasturt.* F.
Thermom. 32. Highest this month.
31. Spurrey, 351.7. *Spergula arvensis*, F.
Alder, berry bearing, 465. *Rhamnus frangula*, F.

VI. MONTH.

Now the mower whets his scythe,
And every shepherd tells his tale
Under the hawthorn in the dale. MILTON.

June 2. Elder, water, 460.1. *Viburnum opulus*, F.
Lilly, yellow water, 368.1. *Nymphæa lutea*, F. Flower

- June 2. Flower de luce, *yellow water*, 374. *Iris pseudo-acor*. F.
 Mayweed, *stinking*, 185.3. *Anthemis cotula*, F.
 Pimpernel, 282.1. *Anagallis arvensis*, F.
 3. Arsmart, 145.4. *Polygonum persicaria*, F.
 * Thyme, 430.1. *Thymus serpyllum*, F.
 Parsnep, *cow*, 205. *Heracleum sphondylium*, F.
 Quicken tree, 452. *Sorbus aucuparia*, D.
 5. Radish, *horse*, 301.1. *Cochlearia armorac*. F.
 Thorn, *evergreen*, 1459.3. H. *Mespilus pyracantha*, F.
 Bramble, 467. *Rubus fruticosus*, F.
 † GOAT SUCKER, or FERN OWL, 27. *Caprimulgus Europæus*, is heard in the evening.
 6. Vine, 1613. H. *Vitis vinifera*, b.
 Flix weed, 298.3. *Sisymbrium sophia*, F.
 Raspberry bush, 467.4. *Rubus idæus*, F.
 Mallow, *dwarf*, 251.2. *Malva rotundifolia*, F.
 Elder, 461.1. *Sambucus nigra*, F.
 Stitchwort, *lesser*, 346. *Stellaria graminea*, F.
 Tare, *everlasting*, 320.3. *Lathyrus pratensis*, F.

* Pliny, lib. 11. §. 14. says, the chief time for bees to make honey is about the solstice, when the vine and thyme are in blow. According to his account then these plants are as forward in England as in Italy.

† This bird is said by Catesby, as quoted by the author of the treatise *De Migrationibus Avium*, to be a bird of passage.

Gout

June 6. Gout weed, 208.3. *Ægopodium podagraria*, F.

Bryony, white, 261.1,2. *Bryonia alba*, F.

ROSE, DOG, 454.1. *Rosa canina*, F.

Bugloss *vipers*, 227.1. *Echium vulgare*, F.

7. Grass, vernal, 398.1. *Anthoxanthum odorat.* F.

Darnel, red, 395. *Lolium perenne*, F.

Poppy, wild, 308.1. *Papaver somnifer*, F.

Buckwheat, 181. H. *Polygonum fagopyrum*, F.

8. Pondweed, narrow leaved, 145.9. *Polygonum amphib.* F.

Sanicle, 221.1. *Sanicula Europæa*. F.

9. Eyebright, *284.1. *Euphrasia officinalis*, F.

Heath, fine leaved, 471.3. *Erica cinerea*, F.
Saxifrage, bugle, hyacinth, D.

Broom, 474.1. *Spartium scoparium*, podded.

Nettle, hedge, 237. *Stachys sylvatica*, F.

12. Wheat, 386.1. *Triticum hybernum*, in ear.

Meadow sweet, 259.1. *Spiræa ulmaria*, f.

SCABIOUS, FIELD, 191.1. *Scabiosa arvensis*, F.

Valerian, great water, 200.1. *Valeriana officinal.* f.

Cinquefoil, marsh, 256.1. *Comarum palustre*, F.

Orchis, lesser butterfly, 380.18. *Orchis bifolia*, F.

13. Willow herb, great hairy, 311.2. *Epilobium hirsutum*, F.

Parfneep, cow, 205. *Heracleum sphondyl.* F.

Betony, water, 283.1. *Scrophularia aquat.* F.

Cockle,

June

13. Cockle, 338.3. *Agrostemma githago*, F.
 Sage, 510.7. H. *Salvia officinalis*, F.
 15. Mallow, 251.1. *Malva sylvestris*, F.
 Nipplewort, 173.1. *Lapsana communis*, F.
 Woodbind, 458.1,2. *Lonicera pericly-*
men. f.

NIGHTINGALE, *sings*.

16. Fir, *Weymouth*, 8. dend. *Pinus tæda*, F.
 Hemlock, 215.1. *Conium maculatum*, F.
 Nightshade, *woody*, 265. *Solanum dulca-*
mara, F.
 Archangel, *white*, 240. *Lamium album*, F.
 17. Vervain, 236. *Verbena officinalis*, F.
 Agrimony, 202. *Agrimonia eupator*, F.
 Hemlock, *water*, 215. *Phellandrium*
aquatic. F.

Acacia, 1719. H. *Robinia pseudo-acacia*,
 F.

18. Yarrow, 183. *Achillea millefolium*, F.
 19. *Thermom*. 44.25. *Highest this month*.
 21. Orache, *wild*, 154.1. *Chenopodium al-*
bum, F.

Solstice. About this time ROOKS come not
to their nest trees at night.

Wheat, 386.1. *Triticum hybernum*, F.

RYE, 388.1. *Secale hybernum*, F.

Self-heal, 238. *Prunella vulgaris*, f.

Parsley, *hedge*, 219.4. *Tordylium anthrisc-*
us, f.

Grasses of many kinds, as festuca, aira, agros-
tis, phleum cynosurus, in ear.

22. Horehound, *base*, 239. *Stachys Germa-*
nica, F.

June

22. St. John's wort, 342. *Hypericum perforatum*, F.
 Parsnep, 206.1. *Pastinaca sativa*, F.
 Mullein, *white*, 287. *Verbascum thapsus*, F.
 Poppy, *wild*, 308. *Papaver somnifer*, F.
23. Larkspur, 708.3. *H. Delphinium Ajacis*, F.
 Marygold, *corn*, 182.1. *Chrysanthemum seget.* F.
24. Rosemary, 515. *H. Rosmarinus officinalis*, D.
25. Vine, 1613. *H. Vitis vinifera*, F.
 Bindweed, *great*, 275.2. *Convolvulus arvensis*, F.
 Feverfew, 187. *Matricaria parthenium*, F.
 Woad, *wild*, 366.2. *Reseda luteola*, F.
 Rocket, *base*, 366.1. *Reseda lutea*, F.
 Archangel, *yellow*, 240.5. *Galeopsis galeobdolon*, F.
 Wheat, 386.1. *Triticum hybernum*, F.
Thermom. 20. *The lowest this month.*
27. *Clover mowed.*
 Pennywort, *marsh*, 222. *Hydrocotyle vulgaris*, F.
 Meadow, *sweet*, 259. *Spiræa ulmaria*, F.
28. Oats *manured*, 389. *Avena sativa*, F.
 Barley, 388. *Hordeum vulgare*, F.
Midsummer shoots of apricot, oak, beech, elm.
- SUCCORY, WILD, 172.1. *Cichorium intybus*, F.
 Blue bottles, 198. *Centaurea cyanus*, F.

Knap-

June

28. Knapweed, *great*, 198. *Centaurea scabiosa*, F.

30. *Currants ripe*.

According to Dr. Hales, May and June heat is, at a medium, 28.5.

* The groves, the fields, the meadows, now no more
With melody resound. 'Tis silence all,
As if the lovely songsters, overwhelm'd
By bounteous nature's plenty, lay intranc'd
In drowsy lethargy.

* I heard no birds after the end of this month, except the STONE CURLEW, 108.4. *Charadrius Oedicephalus*, whistling late at night; the YELLOW HAMMER, 93.2. *Emberiza flava*; the GOLD-FINCH, 89.1. and GOLDEN CRESTED WREN, 79.9. *Motacilla regulus*, now and then chirping. I omitted to note down when the cuckoo left off singing, but, as well as I remember, it was about this time. Aristotle says, that this bird disappears about the rising of the dog star, i. e. towards the latter end of July.

VII. M O N T H.

Berries and pulpos fruits of various kinds,
The promise of the blooming spring, now yield
Their rich and wholesome juices, meant t' allay
The ferment of the bilious blood.

July 2. Beech, 439. *Fagus sylvatica*, F.

Pearlwort, 345.2. *Fagina procumbens*, F.

Carrot, *wild*, 218. *Daucus carota*, F.

Grass, *dog*, 390.1. *Triticum repens*, in ear.

Violet, *Calatbican*, 274. *Gentiana pneumonan*. F.

4. Silver weed, 256.5. *Potentilla anserina*, F.

Betony, 238.1. *Betonica officinalis*, F.

Nightshade, *enchanters*, 289. *Circæa lutea*, f.

X 2

Lavender,

- July 6. Lavender, 512. *Lavendula spica*, F.
 Parsley, *bedge*, *Tordylium anthriscus*, F.
 Gromill, 228.1. *Lithospermum officinale*, F.
 Furze, 475. *Ulex genista*, D.
 Cow wheat, *eyebright*, 284.2. *Euphrasia odont.* F.
7. Pinks, maiden, 335.1. *Dianthus deltoides*, F.
8. Tansey, 188.1. *Tanacetum vulgare*, f.
 Bed-straw, *lady's yellow*, 224. *Galium verum*, F.
 Sage, *wood*, 245. *Teucrium scorodonia*, F.
 Spinach, 162. H. *Spinacia oleracea*, F.
Thermom. 22. *Lowest this month.*
9. Angelica, *wild*, 208.2. *Angelica sylvestris*, F.
Strawberries ripe.
 Fennel, 217. *Anethum fœniculum*, F.
10. Beans, *kidney*, 884. H. *Phaseolus vulgaris*, *podded.*
 Parsley, 884. H. *Apium petroselinum*, F.
 Sun dew, *round leaved*, 356.3. *Drosera rotundifol.* F.
 Sun dew, *long leaved*, 356.4. *Drosera longifol.* F.
 Lilly, *white*, 1109. H. *Lilium candidum*, f.
11. Mullein, *hoary*, 288. *Verbascum phlo-moid.* F.
 Plantain, *great*, 314.1,2. *Plantago major*, F.
- WILLOW, SPIKED, of Theophr.
 1699. H. *Spiræa salicifol.* F.
 Jessamine, 1599. H. *Jasminum officinale*, F.
 Rest harrow, 332. *Ononis spinosa*, F.
 Hyssop,

July

11. Hyssop, 516. H. *Hyssopus officinalis*, F.
Potatoes, 615. 14. H. *Solanum tuberosum*,
F.

Second shoots of the maple.

Bell flower, round leaved, 277. 5. *Campanula*, F.

LILLY, WHITE, 1109. H. *Lilium candidum*, F.

Rasberries ripe.

Figs yellow.

13. LIME TREE, 473. *Tilia Europæa*, F.
Knapweed, 198. 2. *Centaurea jacea*, F.
Stonecrop, 269. *Sedum rupestre*, F.
Grass, knot, 146. *Polygonum aviculare*, F.
Grass, bearded dog, 390. 2. *Triticum caninum*, F.

15. *Thermom.* 39. *Highest this month.*

16. Asparagus, 267. 1. *Asparagus officinalis*,
berries.

Mugwort, 190. 1. *Artemisia vulgaris*, F.

18. Willow herb, purple spiked, 367. 1. *Lythrum salicaria*, F.

YOUNG PARTRIDGES.

Agrimony, water hemp, 187. 1. *Bidens tripart.* F

20. Flax, purging, 362. 6. *Linum catharticum*,
F.

Arsmart, spotted, 145. 4. *Polygonum persicaria*, F.

Lilly, martagon, 1112. H. *Lilium martagon*.

HENS moult.

22. Orpine, 269. *Sedum telephium*, f.
Hart's tongue, 116. *Asplenium scolopendra*, F.

Pen₁₁

July

22. Pennyroyal, 235. *Mentha pulegium*, F.
 Bramble, 461.1. *Rubus fruticosus*. *Fruit red.*
 Laurustinus, 1690. H. *Viburnum tinus*, f.
24. Elecampane, 176. *Inula belenium*, F.
 Amaranth, 202. H. *Amaranthus caudatus*, F.
27. Bindweed, great, 275.1. *Convolvulus sepium*, F.
28. Plantain, great water, 257.1. *Alisma plantago*, F.
 Mint, water, 233.6. *Mentha aquatica*, F.
 Willow herb, 311.6. *Epilobium palustre*, F.
 Thistle tree sow, 163.7. *Sonchus arvensis*, F.
 Burdock, 197.2. *Arctium lappa*, f.
 Saxifrage, burnet, 213.1,2. *Pimpinella saxifraga*, F.
 DEVIL'S BIT, 191.3. *Scabiosa succisa*, F.
30. Nightshade, common, 288.4. *Solanum nigrum*, F.
 DOVE, RING, 62.9. *Columba palumbus*, cooes.

VIII. M O N T H.

Pour'd from the villages, a numerous train
 Now spreads o'er all the fields. In form'd array
 The reapers move, nor shrink for heat or toil,
 By emulation urg'd. Others dispers'd,
 Or bind in sheaves, or load or guide the wain
 That tinkles as it passes. Far behind,
 Old age and infancy with careful hand
 Pick up each straggling ear, &c.

August

1. Melilot, 331.1. *Trifolium officinale*, F.
Rue, 874.1. *Ruta graveolens*, F.
Soapwort, 339.6. *Saponaria officinalis*, F.
Bedstraw, *white, lady's*, 224.2. *Galium palustre*, F.
Parsnep, *water*, 300. *Sisymbrium nasturt.*
F.
Oats almost fit to cut.
3. *Barley cut.*
5. Tanfy, 188.1. *Tanacetum vulgare*, F.
Onion, 1115. H. *Allium cepa*, F.
7. Horehound, 239. *Marrubium vulgare*, F.
Mint, *water*, 233.6. *Mentha aquat.* F.
Nettle, 139. *Urtica dioica*, F.
Orpine, 269.1. *Sedum telephium*, F.
NUTHATCH, 47. *Sitta Europæa*,
chatters.
8. *Thermom.* 20. *Lowest to the 27th of this month.*
9. Mint, *red*, 232.5. *Mentha gentilis*, F.
Wormwood, 188.1. *Artemisia absinthium*,
F.
12. Horehound, *water*, 236.1. *Lycopus Europæus*, F.
Thistle, *lady's*, 195.12. *Carduus marianus*,
F.
Burdock, 196. *Arctium lappa*, F.
ROOKS *come to the nest trees in the evening,*
but do not roost there.
14. Clary, *wild*, 237.1. *Salvia verbenaca*, F.
STONE CURLEW, 108. *Charadrius oedicephalus*, *whistles at night.*
15. Mallow, *vervain*, 252. *Malva alcea*, F.

August

15. GOAT SUCKER, 26.1. *Caprimulgus Europæus*, makes a noise in the evening, and young owls.
16. **Thermom.* 35. The highest to the 27th of this month.
17. Orach, wild, 154.1. *Chenopodium album*.
ROOKS roost on their nest trees.
GOAT SUCKER, no longer heard.
21. Peas and wheat cut.
Devil's bit, yellow, 164.1. *Leontodon autumnal*. F.
26. ROBIN RED BREAST, 78.3. *Motacilla rubecula*, sings.
Goule, 443. *Myrica gale*, F. R.
Golden rod, marsh, 176.2. *Senecio paludosus*, F.
29. Smallage, 214. *Apium graveolens*, F.
Teasel, 192.2. *Dipsacus fullcnum*, F.
Vipers come out of their holes still.

IX. M O N T H.

How sweetly nature strikes the ravish'd eye
Thro' the fine veil with which she oft conceals
Her charms in part, as conscious of decay!

September

2. WILLOW HERB, yellow, 282.1. *Lythymachia vulgaris*, F.
Traveller's joy, 258. *Clematis vitalba*, F.

* From the 27th of this month to the 10th of September i was from home, and therefore cannot be sure that i saw the first blow of the plants during that interval.

September

5. Grass of Parnassus, 355. *Parnassia palustris*, F.
10. Catkins of the hazel formed.
Thermom. 17. The lowest from the 10th to the end of this month.
11. Catkins of the birch formed.
Leaves of the Scotch fir fall.
Bramble still in blow, though some of the fruit has been ripe some time; so that there are green, red, and black berries on the same individual plant at the same time.
- Ivy, 459. *Hedera helix*, f.
14. Leaves of the sycomore, birch, lime, mountain ash, elm, begin to change.
16. Furze, 475. *Ulex Europæus*, F.
Catkins of the alder formed.
Thermom. 36.75. The highest from the 10th to the end of this month.
- CHAFFINCH, 88. *Fringilla caelebs*, chirps.
17. Herrings.
20. FERN, FEMALE, 124.1. *Pteris aquilina*, turned brown.
Ash, mountain, 452.2. *Sorbus aucuparia*, F. R.
Laurel, 1549. H. *Prunus laurocerasus*, f. r.
Hops, humulus lupulus, 137.1. f. r.
21. SWALLOWS gone. Full moon.
23. Autumnal æquinox.
25. WOOD LARK, 69.2. *Alauda arborea*, sings.
- FIELD FARE, 64.3. *Turdus pilaris*, appears.

Leaves

September

25. *Leaves of the plane tree, tawny---of the
 hazel, yellow---of the oak, yellowish green
 ---of the sycomore, dirty brown---of the
 maple, pale yellow---of the ash, fine lemon
 ---of the elm, orange---of the hawthorn,
 tawny yellow---of the cherry, red---of the
 hornbeam, bright yellow---of the willow,
 still hoary.*

27. BLACK BIRD *sings.*

29. THRUSH, 64.2. *Turdus musicus, sings.*

30. *Bramble, 467.1. *Rubus fruticosus, F.*

* Autumnal heat, according to Dr. Hales, at a medium, is 18.25.

X. MONTH.

Arise, ye winds, 'tis now your time to blow,
 And aid the work of nature. On your wings
 The pregnant seeds convey'd shall plant a race
 Far from their native soil.

October

1. Bryony, *black*, 262. *Tamus communis*, F. R.
 Elder, *marsh*, 460.1. *Viburnum opulus*, F. R.
 Elder, 461.1. *Sambucus nigra*, F. R.
 Briar, 454.1. *Rosa canina*, F. R.
 Alder, *black*, 465. *Rhamnus frangula*, F. R.
 Holly, 466. *Ilex aquifolium*, F. R.
 Barberry, 465. *Berberis vulgaris*, F. R.
 Nightshade, *woody*, 265. *Solanum dul-*
camara. F. R.

2. Thorn, *black*, 462.1. *Prunus spinosa*, F. R.
 CROW,

October

2. *CROW, ROYSTON, 39. 4. *Corvus cornix*, returns.
5. Catkins of fallows formed.
6. Leaves of asp almost all off---of chesnut, yellow---of birch, gold-coloured.
Thermom. 26.50. Highest this month.
7. BLACK BIRD, 65.1. *Turdus merula*, sings.
Wind high; rooks sport and dash about as in play, and repair their nests.
9. Spindle tree, 468.1. *Euvonymus Europæus*, F. R.
Some ash trees quite stripped of their leaves. Leaves of marsh elder of a beautiful red, or rather pink colour.
10. WOOD LARK sings.
† RING DOVE cooes.
14. WOOD LARK sings.
Several plants still in flower, as pansy, white behn, black nonsuch, hawkweed, bugloss, gentian, small stitchwort, &c. in grounds not broken up.
A great mist and perfect calm; not so much as a leaf falls. Spiders webs innumerable appear every where. Woodlark sings. Rooks do not stir but sit quietly on their nest trees.
16. GEESE, WILD, 136 4. *Anas, anser*, leave the fens and go to the rye lands.

* Linnæus observes in the *Systema Naturæ*, and the *Fauna Suecica*, that this bird is useful to the husbandman, tho' ill treated by him.

† Aristotle says, this bird does not cooe in the winter, unless the weather happens to be mild.

October

22. WOODCOCK, 104. *Scolopax rusticola*,
returns.

Some ash trees still green.

24. LARK, SKY, 69.1. *Alauda arvensis*, *sings.*
Privet, 465.1. *Ligustrum vulgare*, F. R.

26. *Thermom.* 7. *Lowest this month.*

Honeysuckle, 458.1,2. *Lonicera periclymen.*
still in flower in the hedges, and mallow
and feverfew.

WILD GEESE *continue going to the rye*
lands.

Now from the north
Of Norumbega, and the Samoeïd shore,
Bursting their brazen dungeons, arm'd with ice,
And snow and hail, and stormy gust, and flaw,
Boreas, and Cæcias, and Argestes loud,
And Thrafcias rend the woods, and seas up-turn;
MILTON.

Here ends the Calendar, being interrupt-
ed by my going to London. During
the whole time it was kept, the ba-
rometer fluctuated between 29.1. and
29.9. except a few days, when it sunk
to 28.6. and rose to 30½.

A SIBIRIAN OR LAPLAND Year.

June

23. Snow melts.

July

1. Snow gone.

9. Fields quite green.

17. Plants at full growth.

25. Plants in full blow.

August

2. Fruits ripe.

10. Plants shed their seeds.

18. Snow.

From this time to June 23, snow and ice ;
so that by this account, plants, from
the coming out of the ground to the
ripening of their seeds, take but a
month. And the spring, summer and
autumn, are crouded into the space of
56 days. This account is taken from
a treatise published in the Amæn.
Academ. vol. iv. and agrees with one
i have seen quoted out of Gmelin, who
was in Sibiria many years.

T H E

THE
CALENDAR of FLORA.

BY THEOPHRASTUS.

AT ATHENS, Latitude $37^{\circ} 25'$.

INTRODUCTION.

THE following Calendar was extracted chiefly from Theophrastus's History of plants, and put together in the best manner i was able from imperfect materials. Any one who looks into the original, will see that accuracy ought not to be expected; the manner of marking the times being often very indeterminate.

I am sensible that objections may be made to many parts of this Calendar, but i thought it not worth while to give my reasons for what i have done, and thereby load a piece of mere curiosity with pompous quotations.

It has always seemed extraordinary to me, that when disciples of Linnæus have been sent into so many parts of the world, in order to make discoveries in natural history, viz. Asia, Pensylvania, Lapland, Ægypt, Palestine, Malabar, Surat, China, Java, Spain, America, Gotland, Italy, Apulia, Surinam, and St. Eustatia, that Greece should have been overlooked. It is true, Monsieur Tournefort was sent into the Levant by Lewis the Fourteenth to search for plants, and spent some years there; it is also as true, that he had all the knowledge and zeal necessary for such a commission; but the country was too extensive for one man to examine thoroughly in that space of time. He rambled over most of the Greek islands, Armenia, and other parts of Asia; and though he enriched the royal gardens with many new plants, yet several must have escaped him for want of time, or a proper season.

It were to be wished, therefore, that some persons properly qualified, might be sent to Greece, and be enjoined to make Attica, particularly, their place of residence for a year at least. This might furnish a Flora and Fauna Attica, that
Y would

would be extremely curious to all lovers of natural history; and tend to clear up many passages in those authors, who first opened that branch of knowledge, as well as carried some parts of it much farther, than is generally known, or at least acknowledged; and from whose writings much more benefit might still be reaped, were they better understood, especially in the medicinal way.

As the English nation will have the honour of first making known to the world the true and accurate proportions of the ancient Greek architecture, so i hope it is reserved for us to bring the rest of Europe thoroughly acquainted with the nature of the soil, climate, productions, animals, &c. of a country, whose ancient glory so much resembles our own, and in a great measure has been the cause of it, by furnishing us with the best models of good sense, taste, and just sentiments in every branch of human knowledge. We therefore ought in a particular manner to look upon Attica, from whence, as Cicero says, *Humanitas, doctrina, fruges, jura, leges ortæ, atque in omnes terras distributa putantur*, with the veneration due to a mother country. Should such a scene take place, i could name a person, perfectly well qualified, by his youth and abilities, and zealously inclined upon proper encouragement, to be one of the party. France, Sweden*, and Russia have set us examples of this kind, and why this great and flourishing nation should not follow them, i cannot see. We have had our share in advancing natural history, it is true, but hitherto without any public encouragement.

* Amongst many instances of this sort, there is one that deserves particular notice mentioned Amæn. Academ. p. 445. the author says, that Hasselquist was sent into Ægypt at the expence of his countrymen the East Gothlanders, of the heads of the university, and of the East India company, for the study of natural history; and staid above a year at Cairo.

T H E

CALENDAR of FLORA.

By THEOPHRASTUS.

Feb.

1. —* Violet, *early bulbous*, 1144. H. *Leucoium vernum*, λευκοιον, F.
 Wall flower, 291.2. *Cheiranthus, cheiri*, φλογιον, F.
 Cornel tree, 1536, H. *Cornus, mas*, κρανεια, L.
 Dogberry, 460. *Cornus, sanguinea*, θηλυκρανεια, L.
14. — Bay tree, 1688. H. *Laurus nobilis*, δαφνη, L.
 Alder, 442. *Betula alnus*, κληθρα, L.
 Abele, 446.3. *Populus alba*, λευκη, L.
 Elm, 468. *Ulmus campestris*, πτελεα, L.
 Sallow, *Salix, ιβια*, L.
 Poplar, *black*, 446.1. *Populus nigra*, αιγαιος, L.
 Plane tree, 1706. H. *Platanus orient.* πλατανος, L.
-

* This mark—after some of the figures, denotes that the time is only determined within certain limits.

All the other marks mean the same as in my own Calendar.

March

12 —

* Beginning of SPRING.

Fig tree, 1431. H. *Ficus carica*, ερινεος, L.
 Alaternus, 1608.1. *Rhamnus alatern.*
 φιλυκη, L.

Hawthorn, 453.3. *Cratægus oxyacanth.*
 οξύκεανθος, L.

Christ's thorn, 1708. H. *Rhamnus pali-*
urus, παλιερος, L.

Turpentine tree, 1577. H. *Pistacia te-*
rebin. τερμινθος, L.

Chestnut-tree, 1382. H. *Fagus castanea*,
 διος βαλανος, L.

Walnut tree, 1376. H. *Juglans regia*,
 καρυα, L.

Lilly of the valley, 264. *Convallaria*
Maialis, οινανθη, F.

Narcissus, C. B. 49. ανεμωνη λεμωνια, F.

Daffodil, 1131. H. *Narcissus pseudo-narc.*
 βυλβοκωδον, F.

Corn flag, 1169.2. H. *Gladiolus com-*
munis, F.

Hyacinth, 1162.31. *Hyacinthus comosus*,
 υακινθος, F.

Rose, rosa, ροδον, F.

20. † Elder tree, 461.1. *Sambucus nigra*,
 ακη, L.

* Between February 28 and March 12, the Ornithian winds blow, and SWALLOW appears.

† Between March 11 and 26, the *kite* and *nightingale* appear, that is in the leafing season. The appearance of the hawk is consonant to what Aristotle says, as quoted in the preface, but is determined upon a different kind of testimony; which is a proof that this part of the Calendar at least is tolerably well stated.

Fleawort,

March

20. Fleawort, 881. H. *Plantago psyllium*,
 κυνός, F.
 Oak, 442. *Quercus, robur*, δρυς, L.
 Fig tree, 1431. H. *Ficus carica*, συκη, L.
 Oak, 1386. H. *Quercus, esculus*, φηγος, L.
 Lime tree, 473. *Tilia Europæa*, φιλύρα, L.
 Maple, 470.2. *Acer campestre*, ζυγία, L.
 Apple tree, 451. *Pyrus malus*, μηλέα, L.
 Ivy, 459. *Hedera, helix*, ἰδος, L.
 Beam tree, white, 453. *Cratægus aria*,
 αρία, L.
 26. Tree of life, 1408. H. *Thuia occident.*
 θυεία, L.

April

4. — Succory, 172. *Cichorium intybus*, κίχουρον,
 F.

May 12. Beginning of SUMMER.

15 — Wheat harvest.

- Turpentine tree, 1557. H. *Pistacia terebin*, τερμινθός, F. R.
 Flower of Constantinople, 992.1. H.
Lychnis Chalced. λυχνίς, F.
 Rose campion, 993.2. H. *Lychnis coronar.* δίδανον, F.
 Asphodel, yellow, 1192.4. H. *Asphodelus luteus*, αμαρνή, F.
 Ash tree, 468. *Fraxinus excelsior*, μέλια,
 F. R.
 Maple, 470.2. *Acer pseudo-platanus*,
 σφενδάμων, F. R.
 Pine, 1398. H. *Pinus sylvestris*, πίνος, F.
 Fir tree, common, 1396.2. *Pinus abies*,
 πευκή, F.

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June

20 — * Fir tree, *yew leaved*, 1394. *Pinus picea*,
ελαλη, F.

Yew tree, 445. *Taxus baccata*; μιλα, F.
R.

Cornel tree, 1536. H. *Cornus mas*,
κρανεια, F. R.

Midsummer shoots of the oak.

The fig, the vine, and the pomegranate,
shoot later.

July

23. *Cuckow disappears.*

30. *Etesian winds blow.*

* Botanists doubt which of these two firs is the *πευκη* and which the *ελαλη*. Theophrastus says expressly that the *πευκη* flowers some days before the *ελαλη*, and therefore this question might be probably decided.

August

19 — Beginning of AUTUMN.

Lilly, *Lilium*, λειριον, F.

Crocus, 1173.3. *Crocus autumnal*. κροκ, F.

Dogberry, 460. *Cornus sanguinea*,
θηλυκρανεια, F. R.

Alder, 442. *Betula alnus*, κληθρα, F. R.

QUAIL, 58.6. *Tetrao, coturnix*, ορλιξ, de-
parts.

Sept.

20 — CRANE, 95. *Ardea, grus*, γερανος, departs.
Autumn shoots of trees.

October

12 — Oak, 440. *Quercus, robur*, δρυς, F. R.
Chesnut,

October

- 12 — Chesnut, 1382. H. *Fagus, castanea*, διος
βαλανος, F. R.
Christ's thorn, 1708. H. *Rhamnus paliur.*
παλιουρος, F. R.
Hawthorn, 453.3. *Cratægus oxyacantha*,
οξυακανθος, F. R.
Holm oak, 1391. H. *Quercus coccifer*,
πρινος, F. R.
Alaternus, 1608.1. H. *Rhamnus alatern.*
φιλυερ, F. R.
29 — Venice sumach, 1696. H. *Rhus cotinus*,
κοκκορμηλεα, F.
Apple tree, 451. *Pyrus malus*, μηλεα, F. R.
Beam tree, *white*, 453. *Cratægus aria*,
αρια, F. R.
Lime tree, 473. *Tilia Europæa*, φιλυρη,
F. R.
Box tree, 445. *Buxus sempervivens*, πυξος,
F. R.

Beginning of WINTER.

Novem.

- 15 — Ivy, 459. *Hedera helix*, κιτλος, F. R.
Juniper, 444. H. *Juniperus communis*,
αρκευθος, F. R.
Tree of life, 1408. H. *Thuia occident.*
θυεια, F. R.
Yew tree, 445. *Taxus baccata*, ωιλος, F. R.
Pear tree, 1450. *Pyrus communis*, αχρας,
F. R.
Arbutus, 1577.2. H. αδραχνη, F. R.

I N D E X.

☞ The large Roman Numerals refer to the Months of both Calendars ; the small Numerals to the Days of the Month of the Swedish ; the common Figures to the English.

A.

ACER, IV. 6. 13. 18. 25. V. 2.
 Achellea, VI. xxiii. xxix. VII.
 vi. vii. VI. 18.
 Adæa, VI. vii.
 Adonis, VI. xiii. ix. i.
 Adoxa, V. viii.
 Aegopodium, VI. 6.
 Aelculus, V. xvi. IV. 1. V. 12.
 Agrimonia, VII. vi. IV. 24. V. 17.
 Agrostema, VII. v. VI. 13.
 Ajuga, V. xxx. IV. 29.
 Alauda, III. xx. II. 4. IX. 25.
 X. 10. 14. 24.
 Alchemilla, V. xxv.
 Alisma, VII. 28.
 Allium, V. 6. VIII. 5.
 Alopecurus, VI. iv.
 Alnus, III. 26.
 Alfine, I. 26.
 Amaranthus, VII. 24.
 Amygdalus, IV. 6.
 Anagallis, VI. 2.
 Anas, IV. vii. II. 12. X. 16. 26.
 Anemone, IV. xvi. V. iii. IV.
 10. V. 20.
 Anethum, VII. 9.
 Angelica, VII. 9.
 Anthemis, VI. xxiii. xxix. VI. 2.
 Anthericum, VI. ii.
 Anthyllis, VI. xii.
 Anthoxanthum, VI. 7.
 Antirrhinum, VI. xxviii.
 Apis, III. 2. IV. 10.
 Apium, VII. 10. VIII. 29.
 Aquifolium, IV. 3.
 Aquilegia, VI. vii. V. 25.
 Arctium, VII. ix. VII. 28.
 Ardea, IV. 14.
 Artemisia, VII. x. VIII. xiv. IX.
 vi. IV. 9. V. 1. VII. 16. VIII. 9.
 Arum, IV. 26.
 Asparagus, VII. 16.

Asperula V. 8.
 Atriplex, IX. xxii.
 Atropa, VI. xviii. IV. 18. V. 21.
 Afarum, V. iii.
 Attragalus, VI. xxiv.
 Avena, VI. 28. VIII. 2.
B.
 Ballota, VII. x.
 Bellis, 1. 26.
 Berberis, V. xiii. VI. viii. V. 12.
 X. 1.
 Betonica, V. v.
 Betula, V. xiii. xiv. IV. 1. 7. 27.
 Bidens, VII. 18.
 Brassica, IV. 15.
 Briza, VI. xviii.
 Bryonia, VI. xxviii. IV. 27. VI. 6.
 Bunium, V. 20.

C.

Caltha, V. xxi. IV. 16.
 Campanula, VI. xi. xvi. xxix.
 VII. i. ii. vi. VII. 11.
 Cannabis, VII. ix.
 Caprimulgus, V. 5. VIII. 15.
 Cardamine, V. xxviii. IV. 18.
 V. 20.
 Carduus, VI. xxii. VII. ix. xvii.
 VIII. 12.
 Carpinus, V. xvi. III. 29. IV.
 10. 13. 25.
 Castanea, IV. 16.
 Centaurea, VI. xxii. xxiv. VII.
 i. vi. xxii. VI. 28. VII. 13.
 Chærophillum, V. xxv. VII. vii.
 IV. 25. 29. V. 28. VI. 5.
 Charadrius, VIII. 14.
 Cheiranthus, IV. 21.
 Chelidonium, V. xxvii. V. 5. 10.
 Chenopodium, IV. 24. VI. 21.
 VIII. 17.
 Chrysanthemum, VI. xvii. xxix.
 VI. 23.
 Chrysoplenium, V. iii.

Cicorium,

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- Cichorium, VII. xii. VI. 28.
 Ciconia, V. ix.
 Circea, VII. x. VII. iv.
 Cistus, VI. xx.
 Clematis, IX. vi. IX. 2.
 Clinopodium, VII. x.
 Cochlearia, III. 21. VI. 5.
 Colchicum, VII. xviii. VIII. xxviii.
 Columba, III. 5. VII. 30. X. 10.
 Comarum, VI. xx. VI. 12.
 Conium, VI. 16.
 Convallaria, V. xxx. V. 3. 10.
 Convolvulus, VII. i. iv. IV. 25.
 VII. 27.
 Conyza, VII. xxiii.
 Cornus, V. xxx.
 Corvus, II. 12. III. 2. VIII. 17.
 X. 2.
 Corylus, IV. xii. V. ix. I. 23. II.
 22. IV. 7.
 Cratægus, V. xv. VI. xii. xvii.
 III. 29. IV. 28. V. 10.
 Crepis, VI. xxix.
 Crocus, IV. xiii.
 Cucubalus, VIII. i.
 Cuculus, V. xii. IV. 17.
 Cygnus, IV. x.
 Cynoglossum, IV. 10. V. 4.
 Cyprius, V. xxv. xxx.
 Cytisus, IV. xiii.
 D.
 Dactylis, VII. xxii.
 Daphne, IV. xiii. IV. 16.
 Daucus, VII. vi. VII. 2.
 Delphinium, VI. 23.
 Dianthus, VI. xxiv. xxix. VII.
 viii. VII. 7.
 Dies Chalybeati, II. xxii.
 Digitalis, VII. iv.
 Dipfacus, VII. xviii. xx. VIII. 29.
 Draba, IV. xv.
 Drosera, VII. x.
 E.
 Echium, VI. 6.
 Elymus, VI. xxviii.
 Empetrum, IV. xxx.
 Epilobium, VI. xxiv. xxvi. VII.
 xii. xv. VI. 13. VII. 28.
 Erica, VI. xxix. VI. 9.
 Erigeron, VII. xv.
 Eriophorum, V. xxx.
 Erysimum, V. xxv. IV. 10. 16.
 V. 16.
 Esox, IV. x.
 Euonymus, V. xiv. X. 9.
 Eupatorium, VII. xv.
 Euphorbia, IV. 25.
 Euphrasia, VI. xvii. VI. 9. VII. 6.
 F.
 Fagus, V. xvi. IV. 18. 21. V. 9.
 VII. 2.
 Ficus, IX. iv. IV. 16. 21. 22. VII.
 11.
 Filipendula, VI. xxii.
 Fragaria, VI. xxvi. IV. 13. VII. 9.
 Frankenia, VII. ix.
 Fraxinus, V. xxi. IV. 18. 22. V. 6.
 Fringilla, II. 16. IX. 16.
 G.
 Galanthus, IV. xiii. I. 26.
 Galeopsis, VI. 25.
 Galium, VII. xvi. VII. vi. IV. 3.
 V. 13. VII. 8. VIII. 1.
 Genista, IV. 22.
 Gentiana, VI. xxii. VII. 26. VII. 2.
 Geranium, V. xxvi. xxx. VI. v.
 ix. xi. xiv. IV. 23. 27. V. 15.
 Geum, VI. ii. xiii. V. 1. 28.
 Glechoma, V. xxvi. IV. 16.
 Gnaphalium, V. xxvi.
 H.
 Hedera, VIII. 9. IX. 11.
 Helenium, VII. 24.
 Helleborus, IV. xxi.
 Hemerocallis, VI. xx. VII. vii. xvi.
 Heracleum, VII. i. III. 28. IV.
 29. VI. 3. 13.
 Herniaria, VI. xxix.
 Hesperis, VI. vii.
 Hieracium, VII. xvi.
 Hippophae, V. xiv.
 Hirundo, V. ix. IV. 6. IX. 21.
 Holcus, VII. v.
 Hordeum, V. xiii. V. 6. VIII. 3.
 Hottonia, V. 3.
 Humulus, VII. vi. IV. 14. IX. 20.
 Hyacinthus, IV. 26.
 Hybernacula, V. viii.
 Hydrocotule, VI. xxvii.
 Hyoscyamus, VI. xii. V. 26.
 Hypericum,

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- Hypericum*, VI. xxix. VII. vi. xii.
 IV. 27. VI. 21.
Hypochaeris, VI. xxvii.
Hyssopus, VII. 11.
 I.
Jasminus, IV. 28. VII. 11.
Ilex, I. 23. IV. 24. 26. X. 1.
Impatiens, VII. xviii.
Inula, VII. xiii. xxiv. IX. xvii.
Iris, VI. x. VII. vi. VI. 2.
Ifatis, VI. xxix.
Juglans, IV. xiv. xviii. V. 15.
Juniperus, VI. iii. IV. 28.
 L.
Lamium, I. 23. V. 6. VI. 16.
Lapsana, VI. 15.
Lathyrus, VI. xvii. xxix.
Lavandula, VII. vi.
Laurus, III. 11. IV. 10. 29. V. 1.
Leontodon, VI. vii. IV. 3. 10.
 VIII. 21.
Leonurus, VII. vii.
Lepidium, V. iii. VII. xiii.
Leucoium, IV. xiii.
Libellula, V. xxi.
Ligusticum, VII. vii.
Ligustrum, V. xiv. X. 24.
Lilium, VI. xviii. VII. xx. VII.
 10. 11.
Linum, VI. vii. xxiv. VII. 18.
Liriodendro, IV. 16. V. 4.
Lithospermum, VII. 6.
Lonicera, IV. xv. VII. xii. I. 11.
 23. VI. 15. X. 26.
Lotus, VI. vii.
Lychnis, V. xxx. VI. xiv. xvii.
 IV. 22. V. 26. 30.
Lycopodium, IV. i.
Lycopsis, VIII. xii.
Lycopus, VIII. xii.
Lythmachia, VI. xxii. VII. iv. V.
 25. IX. 2.
Lythrum, VII. ii. VII. 18.
 M.
Malva, VII. xii. IV. 13. VI. 6.
 15. VIII. 15. X. 26.
Marrubium, VIII. 7.
Matricaria, VI. xi. IV. 10. VI.
 25. X. 26.
Medicago, VI. xxvii.
- Meleagris*, IV. xv.
Melica, VI. vii.
Melissa, VII. xxvi.
Mentha, VII. xv. VII. 22. 28.
 VIII. 7. 9.
Menyanthes, VI. xiii. IV. 22.
Mercurialis, V. 1. IV. 12.
Mespilus, IV. 22. VI. 5.
Mirabilis, VII. xvi.
Morus, IX. i. IV. 12. 18. V. 14.
 20.
Motacilla, IV. xiii. V. iii. xv. II.
 12. IV. 9. 16. 28. VIII. 26.
Myosotis, V. 13.
Myrica, V. xiv. VIII. 26.
 N.
Narcissus, V. xv. IV. 1.
Noctes, V. xxiv. VI. 20.
Nymphæa, IV. xvii. VI. xiv. xvi.
 VI. 2.
 O.
Oenothera, VII. v.
Ononis, VII. vi. VII. 11.
Ophrys, VI. xxii. V. 5.
Origanum, VII. x.
Orchis, VI. vii. xiv. xv. VI. 12.
Ornithogalum, IV. xv.
Orobis, V. xiii.
Osmunda, VI. xxiv.
Oxalis, V. xiii. IV. 16.
 P.
Pæonia, VI. ii. xvi.
Papaver, VI. xxiv. VII. vii. VI.
 22.
Papilio, IV. vii.
Parietaria, V. xxiii.
Paris, VI. vii.
Parnassia, VI. xvi. IX. 5.
Pastinaca, VI. 22.
Pavo, VI. xxix.
Perdix, VII. 18.
Phaseolus, VII. 10.
Phellandrium, VI. 17.
Philadelphus, V. xiv. VI. xxiv.
Phyllerea, IV. 22.
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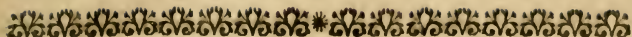
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THE
SWEDISH PAN.

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THE
SWEDISH PAN.

BY
NICOLAS HASSELGREN.

Upsal, 1749. Decem. 9.

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§. I.

THE antients attributed the pastoral life to *Pan*, the care of flowers to *Flora*, hunting to *Diana*, and the cultivation of grain to *Ceres*. We, tho' acknowledging only one Deity, who governs all things, yet often use these names to denote the subject we undertake to treat upon: What word is now more known among botanists than the word *Flora*; by which they mean all those plants, which grow within a certain compass of ground; as our *Fauna Suecica*

takes in all those animals, which are natives of Sweden? For a like reason we have entitled this small tract the *Swedish Pan*; intending thereby to denote the five domestic quadrupeds, which live upon plants growing in Sweden; or the devouring army of *Pan*, which lays waste the provinces of the *Swedish Flora*. We choose by this means to avoid a prolix definition, which is always disagreeable for the title of a book.

§. 2.

The pastoral life, by the testimony of both sacred, and prophane history, is nearly as old as man himself; so that i would willingly derive the knowledge, which i am going to deliver, from the most ancient times. But altho' plants have been constantly obvious to the eyes of every man; yet i am obliged to declare, that we have nothing delivered down to us in any book concerning the kinds of plants proper for the different kinds of cattle; so that i may be sure of not disgusting my reader with stale matter new dressed up. For the whole of what i present to him is new.—Our illustrious president in his journey thro' Dalecarlia ann. 1734, made the first attempt this way, as may be seen Flor. Lapp.

Lapp. p. 158: where he says thus. ‘ In my
 ‘ journey thro’ Dalecarlia, when we had climbed
 ‘ up the mountains, and were got into Norway,
 ‘ my fellow travellers being tired, and asleep, i
 ‘ wandered about in a dismal wood, and per-
 ‘ ceived that the horses easily distinguished
 ‘ wholesome from noxious food ; for being very
 ‘ hungry, they devoured all sorts of plants, ex-
 ‘ cept the following ; *meadow sweet, valerian,*
 ‘ *lilly of the valley, angelica, loose-strife, marsh-*
 ‘ *cinquefoil, cranes bill, bellebore, monks-hood,* and
 ‘ many shrubs. This gave me a hint to re-
 ‘ commend to the curious, that they would set
 ‘ about examining what plants such animals, as
 ‘ live on vegetables, viz. *the cow, the sheep, the*
 ‘ *goat, the deer, the horse, the hog, the monkey*
 ‘ and their species will not touch. An examina-
 ‘ tion which would not be without its use, were
 ‘ it properly made.’ Notwithstanding this re-
 commendation no enquiry was made, till our
 president returned home from his travels thro’
 foreign countries, and made a progress thro’
 our own provinces. Afterwards professor Kalm,
 that worthy disciple of so great a master, follow-
 ed his example ; so that in his journey to Bahus
 we find mention made of some plants, which
 cattle either eat, or refuse. Ann. 1747 and

1748 our president undertook with great diligence not only to make experiments himself, but to excite his disciples, and auditors to do the same ; of which number i was one. Thus at last many experiments were made, and repeated, especially by D. D. Hagstrom, Mag. E. G. Liidbeck, E. Ekelund, J. G. Wahlbom, L. Montin, F. Oldbers, J. C. Forskahl, A. Fornander ; not to mention others, who strove, as it were, to out-do one another in finding the plants, which were suitable to different animals.

§. 3.

The difficulty however of examining all the Swedish plants, and getting animals proper for experiments, which ought all to be repeated, has hindered us from being able to give a compleat work on this subject. But the greatest part, and the most common vegetables of Sweden being now determined by us ; what is wanting may be supplied from time to time. We hinted that animals proper for experiments, which ought to be taken from among *cows, goats, sheep, horses, and swine*, are difficult to be found, for these reasons ; first, because some plants are eaten by them in the spring, which
they

they will not touch all the summer ; when they are apt to grow rank in taste, and smell, and become stalky and hard. Thus many people eat the *nettle* in the spring ; but who could bear it afterwards ? Again, because some kinds of animals eat the flower, and will not eat the stalks ; others eat the leaves and will not eat the stalks. N. B. When they eat the leaves, we say in general they eat the plant, otherwise there would be few grasses they could be said to eat. *Æcon. Nat.* Next, the animals ought not to be over hungry, when we make our experiments, if we intend to make them properly. For they will greedily devour most kinds of plants at such a time, which they will absolutely refuse at another. Thus when they come immediately out of the house, they are not fit to make experiments upon ; for then they are ravenous after every green thing that comes in their way. The best method is to make the experiments when their bellies are almost full, for they are hardly ever so intirely. Moreover the plants ought not to be handled by sweaty hands ; some animals will refuse the most pleasing, and tasteful in that case. We ought to throw them on the ground, and if we find the animal refuses to eat them, we must mix them
with

with others that we know they like ; and if they still refuse them, we have a sure proof ; especially if the same be tryed with many individuals:

§. 4.

Our views do not extend beyond the Swedish plants, and that for the sake of our own œconomy. Let forreigners look to that part which concerns themselves, and thus our work will be confined within moderate bounds. We can produce above 2000 certain experiments, some of which were repeated ten times over; some twice as often. If we take the *Flora Suecia* Holm. 1745. and put to any herb the generical name, adding the number, and some epithet by way of difference, our work will be very much abridged.

§. 5.

It is manifest that the vegetable world was intended for the support of the animal world; in-
somuch that altho' not a few animals are carnivorous, yet these animals which they devour cannot subsist without vegetables. In this spe-

culatation we behold with admiration the wisdom of the Creator, which has made some vegetables absolutely disagreeable to some animals that live upon plants, while these plants are agreeable to others. And there are plants, which are poisonous to some animals, which are very wholesome to others, and on the contrary. This did not happen by chance, but was contrived for wise purposes. For if the Author of nature had made all plants equally grateful to all kinds of quadrupeds, it must necessarily have happened, that one species of them being remarkably increased, another species must have perished with hunger, before it could have got into better pasture ; the vegetables being consumed over a large tract of ground. But as it is ordained every species must by force leave certain plants to certain animals, so that they always find something to live upon, till they meet with better pasture ; in the like manner we find it contrived in relation to the plants themselves, which do not all grow in the same country, and climate ; but every plant has its place appointed by the Creator, in which it grows more abundantly, than any where else. From hence we may observe, that those animals, which chiefly live upon particular plants, chiefly
abound

abound in certain places. Thus the *lichen* or *liverwort*, Fl. 980. is found in greatest plenty on the cold alps, and therefore the *reben deer*, which all winter live mostly upon this plant, are obliged to live there. The *festuca*, Fl. 94. which flourishes and spreads most on dry pastures, draws the sheep thither, which above all things delight in that kind of grass. The seeds of the *dwarf birch*, Fl. 777. which afford the best sort of food to the *rough-legg'd partridge*, and the *Norway rat*, Fn. 26. tempt them to dwell in these northern parts of the world. *Camels hay*, Mat. Med. 312. which above all plants, thrives on loose sand, draws the camel to choose those barren places, as they there find food most agreeable to them; not to mention many other similar instances. Trees, whose heads shoot up so high, that quadrupeds cannot easily reach them, afford nourishment for that reason to more numerous tribes of insects, as the *fallow*, the *oak*, the *pear*, &c. The Creator, who most wisely established this law, has as it were imprinted it on the organs of animals, that they might not offend against it thro' ignorance; and as every transgression has its punishment allotted, so also no offence against the law of nature

nature can escape. Animals, which violate this law are punished by diseases or death; and hence we behold with admiration that brutes, which were designed to be guided by instinct, can by no means whatever be prevailed upon to act against it. If by chance it happens that any animal offends this way, and suffers for it, we vulgarly say it has taken poison; so that ignorant people wonder, not to say murmur at the wise disposition of the Creator, who has produced so many noxious plants; but without sufficient reason, for no one plant in the world is universally poisonous, but all things are good, as they came from the hands of the Creator. Physicians often mention that this or that plant is deadly, because its particles are of a nature apt to wound the fibres of the body or corrupt the juices. But this is only respectively to the species of animals, e. g. the *sun-spurge*, Fl. 536. has a milky juice, which causes blotches in our skin and hurts our fibres, and therefore it is said to be poisonous; yet the *moth*, Fn. 825. almost entirely lives upon this plant, and prefers it both for taste and nourishment to all others, as it thrives best upon it. Thus one animal leaves that, which to itself is poisonous, to another animal, which feeds upon it deliciously.

Long-

Long-leaved water hemlock will kill a *cow*, whereas the *goat* browses upon it greedily. *Monks-hood* kills a *goat*, but will not hurt a *horse*; and the *bitter almond* kills a *dog*, but is wholesome food for *man*. *Parsley* is 'deadly' to *small birds*; while *swine* eat it safely; and *pepper* is mortal to *swine*, and wholesome to *poultry*. Thus every creature has its allotted portion. Animals distinguish the noxious from the salutary by smell and taste. Younger animals have these senses more acute, and therefore are more nice in distinguishing plants. An empty stomach will often drive animals to feed upon plants, that were not intended for them by nature. But whenever this has happened they become more cautious for the future, and acquire a certain kind of experience; e. g. *the monks-hood*, which grows near Fahluna, is generally left untouched by all the animals, that are accustomed to these places; but if foreign cattle are brought thither and meet with this vegetable, they venture to take too large a quantity of it, and are killed^b. The cattle that have

^b The same thing has been told me by the country people in Herefordshire in relation to *meadow-saffron*, which grows in plenty in some parts of that county. Gmelin, *Flor. Sibirica*, p. 76. says that cattle eat the leaves of the *hellebore*, 40. when they first spring out of the ground, and are thereby killed.
been

been reared in the plains of Schonen, and Westrogothia, commonly fall into a dysentery when they come into the woodland parts, because they feed upon some plants, which cattle used to those places have learned to avoid. In the spring, when the *water hemlock* is under water, so that the cows cannot smell it, they dye in heaps^c. But when the summer comes on
and

^c This affair is of so much consequence to the farmer, that i think it right to transcribe a passage out of Linnæus upon this subject.

“ When I arrived, says he, at Tornea, the inhabitants complained of a terrible disease, that raged among the horned cattle, which upon being let into the pastures in the spring dyed by hundreds. They desired that i would consider this affair, and give my advice what was to be done in order to put a stop to this evil. After a proper examination i thought the following circumstances worth observing.

1. That the cattle dyed as soon as they left off their winter fodder, and returned to grazing.

2. That the disease diminished as the summer came on, at which time, as well as in the autumn, few dyed.

3. That this distemper was propagated irregularly, and not by contagion.

4. That in the spring the cows were driven into a meadow near the city, and that they chiefly dyed there.

5. That the symptoms varied much, yet agreed in this, that the cattle, upon grazing indiscriminately on all sorts of herbs, had their bellies swelled, were seized with convulsions, and in a few days expired with horrible bellowings.

6. That

and has dried the ground, they are very careful not to touch it. It is also true, that all vegetables prohibited by nature to particular animals are not equally pernicious; and therefore though through necessity and hunger they eat them,

6. That no man dared to flea the recent carcases, as they found by experience, that not only the hands of such as attempted it, but their faces too had been inflamed, and mortified, and that death had ensued.

7. The people enquired of me, whether there were any kinds of poisonous spiders in that meadow, or whether the water which had a yellowish tint was not noxious.

8. That it was not a murrain was clear, because the distemper was not contagious, and because that distemper is not peculiar to the spring. I saw no spiders but what are common all over Sweden; and as to the water, the sediment at the bottom, that caused the yellowness, was nothing but what came from iron.

9. I was scarcely got out of the boat, which carried me over the river into the meadow, before i guessed the real cause of the disease. For i there beheld the *long-leaved water hemlock*. My reasons for guessing this were as follow.

10. Because in that meadow, where the cattle first fell ill, this poisonous plant grows in great plenty, chiefly near the banks of the river. In other places it was scarce.

11. The least attention will convince us that brutes shun whatever is hurtfull to them, and distinguish poisonous plants from salutary by natural instinct; so that this plant is not eat by them in the summer, and autumn, which is the reason that in those seasons few cattle dye, viz. only such as either accidentally, or pressed by extreme hunger, eat of it.

12. But

them, yet they do not immediately dye; but it is certain that they cannot have from thence good and proper nourishment.

§. 6.

The end of this kind of knowledge is not

12. But when they are let into the pastures in spring, partly from their greediness after fresh herbs, and partly from the emptiness and hunger which they have undergone during a long winter, they devour every green thing which comes in their way. It happens moreover that herbs at this time are small, and scarcely supply food in sufficient quantity. They are besides more juicy, are covered with water, and smell less strong, so that what is noxious is not easily discerned from what is wholesome. I observed likewise, that the radical leaves were always bitten, the others not; which confirms what I have just said.

13. I saw this plant in an adjoining meadow mowed along with grass for winter fodder; and therefore it is not wonderfull, that some cattle, tho' but a few, should dye of it in winter.

14. After i left Tornea i saw no more of this plant till i came to the vast meadows near Limmingen, where it appeared along the road, and when i got into the town i heard the same complaints, as at Tornea, of the annual loss of cattle with the same circumstances.

15. It would therefore be worth while to eradicate carefully these plants, which might easily be done, as they grow in marshy grounds; and are not hard to find, as they grow by the sides of pools or rivers. Or if this could not be done, the cattle should not be suffered to go into such places, at least during the spring. For i am persuaded, that later in the year they can distinguish this plant by the smell alone.

bare curiosity, although were this the case every part of knowledge, which sets forth the stupendous works of the Creator, is never to be looked upon as of no consequence. On the other hand we do not pretend to gain any medicinal advantages from these speculations, namely, to be able from hence to conclude, that this or that plant is noxious to man, because it is so to this or that brute animal. Nor do we for that reason approve of Wepfer's experiments upon dogs, and other animals, as if any knowledge can be thence gained in regard to man. No, the end we aim at is merely œconomical.

α. From these experiments we may know whether certain pastures afford good nourishment for this or that species of animals. We see e. g. *keifers* waste away in enclosures, where the *meadow-sweet* grows in abundance, and covers the ground so that they can scarce make their way through it; the countrey people are amazed, and imagine that the pasture is too rich for them; not dreaming that the *meadow-sweet* affords them no nourishment. Whereas the *goat*, which is bleating on the other side of the hedge, is not suffered to go in, though he longs to be browsing upon this plant, which to him is a most delicate and nourishing food.

ℓ. From

℞. From these experiments we may almost be sure by affinity and analogy, whether meadows or pastures are salutary or noxious to particular animals; e. g. long experience has taught us that our *sheep* take up poison in marshy grounds, though no one till lately knew what was the particular poison. Yet the *spiderwort* 267. the *mouse-ear scorpion grass* 149. the *mercury* 823. the *sun-dew* 257,8. the *hairy wood grass* 287. the *lesser spearwort* 458. the *butterwort* 21. have evidently suspicious marks^c. I will therefore propose a new experiment. The *andromeda* Fl. Virgin. 160. is known to be a most rank poison to sheep in Virginia. The *andromeda*, called by the people of New York *dwarf laurel*, Cold. Act. Upsal. 1743. p. 123. is very fatal to the sheep in New York. These two plants are of a different species, but of the same natural genus, and therefore have the same virtues. Amongst us, especially in the northern parts, the wild *rosemary*, *andromeda*

^c There is great reason to think that what makes low grounds so noxious to sheep is not the moisture, but the plants that grow there. For it is observed by shepherds that the great danger to sheep is immediately after a fresh spring of grass, which i imagine is owing to their licking up the young and tender shoots of poisonous plants, along with their proper food, not being able to distinguish them.

335. grows every where in marshy grounds, which being of the same natural genus with the foregoing, we may reasonably conclude that it destroys our sheep. To this we may add, that it is on account of three other species of *andromeda* 336,7,8. which grow on the Lapland mountains, that the sheep there never are healthy; and lastly although the *cistus ledon* 341. is not a species of *andromeda*, yet being of the same natural class, it is not unlikely but that this plant is far from affording good nourishment to sheep. This conjecture gives our shepherds an unexpected opportunity of making experiments with their sheep; and indeed they cannot omit to do it without being justly blameable, since on this the health of their whole flock depends. It is particularly to be noted upon this occasion, that the botany of America, a country so far disjoyned from us, gives a hint for considering things of the greatest use, of which the antients did not so much as dream.

γ. From hence the œconomist may truly judge of his meadows, and know that some are vastly preferable to others for certain animals. For although cattle, pressed by necessity and hunger, will feed upon vegetables less gratefull to them; yet it is not to be doubted but that they

they are not equally well nourished by these as by others. Thus the Dalecarlians are obliged in a scarcity of wheat to support themselves by *bread* made of the *bark* of the *pine*; yet it does by no means follow from hence that this affords proper nourishment. We see that *horses* in time of war, when pressed by extreme hunger, will eat *dead hedges*, but we cannot hence conclude, that wood is good food for them.

§. The industrious farmer may judge from hence, when he sows his meadows with hay feeds for pasture, that it is not indifferent what kinds of feeds he chooses, as the vulgar think. For some are fit for *horses*, others for *cows*, &c. *Horses* are nicer in choosing than any of our cattle; *siliquose* and *filiculose* plants particularly are not relished by them. *Goats* feed upon a greater variety of plants than any other cattle, but then they chiefly hunt after the extremities and flowers. *Sheep* on the contrary pass by the flowers and eat the leaves. Not to mention the different disposition in different animals as to grazing near the ground or not. The countryman who understands these things, and knows how in consequence to dispose of his grounds, and assign each kind of cattle to its properest food, must necessarily have them more healthy

and fat, than he who is destitute of these principles. The good œconomist will observe the same of his hay. For although many herbs, when dry, are eat, which when green would be refused, it does not follow from hence that they yield good nourishment. Much might be added concerning the propension of cattle to this or that plant, which the compass of this small tract will not admit of; e. g. that *sheep* above all things delight in the *festuca* 95. and grow fatter upon it than any other kind of grass; that *goats* prefer certain plants, but being led by an instinct peculiar to themselves, they search more after variety, and do not long willingly stick to any one kind of food whatever; that *geese* are particularly fond of the seeds of the *festuca*, Fl. 90; that *swine* greedily hunt after the roots of the *bull-rush* 40. while they are fresh, but will not touch them when dry. Hence it appears that it is in vain to contrive engines to extract the roots of the *bull-rush* out of the water, and dry them for the use of these animals in winter. Because these animals spoil the meadows, where the *scorzonera* grows, in order to come at its root, which they delight in; and also the fields, to get at the roots of *elowns-all-beal*, the husbandman imagines they do

do good to his fields by ploughing the ground and eating the roots of *couch-grass*, whereas they never touch them, but when pressed by the utmost necessity ^d.

§. 7.

To give a view of my design in a few words. I have disposed the plants mentioned in the *Flora Suecica* according to their numbers ; and to be as short as possible, it was necessary to add the generical name with a short and incomplete

^d In the same way with us it is a notion that prevails commonly that *cows* eat the *cow-foot* that abounds in many meadows, and that this occasions the butter to be yellow, from whence i suppose it is generally known by the name of the *butter-flower*. But this i believe is all a mistake, for i never could observe that any part of that plant was touched by *cows* or any other cattle. Thus Linnæus observes, *Fl. Lapp.* p. 195. that it was believed by some people that the *marsh-marygold* made the butter yellow, but he denies that cows ever touch that plant. Yet he thinks that all kinds of pasture will not give that yellowness, and then observes that the best and yellowest butter he knows, and which is preferred by the dealers in those parts to all other butter, was made where the *cow-wheat* grew in greater plenty than he ever saw any where else. This shews how very incurious the country people are in relation to things they are every day conversant with, and which it concerns them so much to know.

epithet, which however may be illustrated out of the Flora itself. I have distinguished the cattle against every plant into five columns. The first of which contains *oxen*. The second *goats*. The third *sheep*. The fourth *horses*. The fifth *swine*. By the mark (1) i have denoted those plants which are eaten; by the mark (o) those which are not eaten; by both together those which are sometimes eaten, sometimes refused; or are eaten when cattle are more used to them, and are more hungry, otherwise not.

§. 8.

Upon the first view of this subject the reader will perceive, that it is not treated compleatly, so that every Swedish plant is pointed out, and by what animals it is eaten. What generally happens upon breaking up old pasture lands, viz. that for the first years it cannot be cleansed from all useles weeds, and be laid down fine like a garden, but will here and there have rough tumps and hard clods, unless we will let it lye fallow for a very long time; the same or something like it has happened upon this occasion,

I am

I am apt to believe however that the reader will be better pleased that I have opened this new scene, than if I had waited longer in order to gain farther light. For since there are many people here curious in botany and œconomy, i hope they will all lend a helping hand, that i may one day be enabled to give a more compleat edition of this piece °.

° After this in the original follows a long table of experiments, of which i shall only give a small specimen ; as the whole would increafe the bulk but not the value of this piece to such readers as this translation is intended for, since they would neither know the plants by the names the author has given them, nor by any i could put in their room. However i shall for curiosity give a specimen, and add the general result of his experiments, just as he has marked it at the end of his table ; which is as follows. ‘ Thus far,’ says he, ‘ we have given 2314 experiments. From these it appears
‘ that

Oxen eat	276	refuse	218	plants
Goats	449		126	
Sheep	387		141	
Horses	262		212	
Swine	72		171	

‘ And thus these animals leave untouched 886 plants.

‘ These animals will not eat any kind of *mosfs*.

‘ The goats are very fond of the *algæ*.

‘ Some of them greedily devour the *fungi*, others will
‘ not taste them. But we recommend farther trials in relation to these matters.’

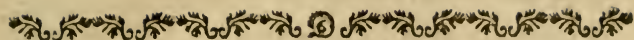
Then follows an account of some trials made by Dr. O. Hagstrom to the same purpose in relation to *rhœn deer*,
but

but as they no ways concern us, i have omitted to mention them.

N. B. For the table i have chosen not to take such plants as occurred first in my author, but to select the grasses of our own countrey, and have given English names to them of my own invention, the reason of which will appear in the following observations.

		O.	G.	S.	H.	Sw.
Spring grass	————	1	1	1	1	-
Mat grass	————	10	1	1	1	0
Canary grass, <i>reed</i>	————	1	1	1	1	0
Cat's-tail, <i>meadow</i>	————	1	1	0	1	0
Fox-tail, <i>meadow</i>	————	10	1	1	1	10
———— <i>flote</i>	————	1	1	1	1	0
Millet grass	————	1	1	1	-	-
Bent grass, <i>filky</i>	————	-	1	0	1	-
———— <i>fine</i>	————	1	1	-	1	-
Hair grass, <i>small leaved</i>	————	1	1	1	1	-
———— <i>water</i>	————	1	-	1	1	-
Meadow, <i>creeping</i>	————	1	1	1	1	0
———— <i>annual</i>	————	1	1	1	1	1
———— <i>great</i>	————	1	1	1	1	1
———— <i>narrow leaved</i>	————	1	1	1	1	1
———— <i>common</i>	————	1	1	1	1	1
Cock's-foot grass, <i>rough</i>	————	0	1	1	1	0
Dogs-tail grass, <i>crested</i>	————	-	-	1	-	-
———— <i>blue</i>	————	-	1	1	1	0
Fescue grass, <i>flote</i>	————	0	1	1	1	10
———— <i>purple</i>	————	1	1	1	1	-
———— <i>sheep's</i>	————	1	1	1	1	-
Brome grass, <i>field</i>	————	1	1	1	1	-
———— <i>spiked</i>	————	-	1	1	1	-
Oat grass, <i>meadow</i>	————	1	1	1	1	-
———— <i>bearded</i>	————	-	10	-	-	-

Observations on GRASSES.



Observations on GRASSES.

AS the foregoing treatise contains some observations on grasses^f, that are quite new, and as this affair is of the utmost importance to the husbandman, i shall subjoyn some observations of my own relating to the same subject.

It is wonderfull to see how long mankind has neglected to make a proper advantage of plants of such importanee, and which in almost every countrey are the chief food of cattle. The farmer for want of distinguishing, and selecting grasses for feed, fills his pastures either with weeds, or bad, or improper grasses ; when by making a right choice, after some trials he might be sure of the best grass, and in the greatest abundance that his land admits of. At present if a farmer wants to lay down his land to grass,

^f By grasses are meant all those plants, which have a round, jointed and hollow stem, surrounded at each joint with a single leaf, long, narrow and pointed, and whose seeds are contained in chaffy husks. It appears by this definition, which is Ray's, that all the kinds of grain, as wheat, oats, barley, &c. are properly grasses, and that the broad, the white, the hop, &c. clovers are not grasses, though so frequently called by that name.

what

what does he do? he either takes his seeds indiscriminately from his own foul hayrick, or sends to his next neighbour for a supply. By this means, besides a certain mixture of all sorts of rubbish, which must necessarily happen; if he chances to have a large proportion of good seeds, it is not unlikely, but that what he intends for dry land may come from moist, where it grew naturally, and the contrary^s. This is such a slovenly

^s Since the first edition of these tracts i have had several opportunities of observing instances of this slovenly kind of husbandry, and its effects. Instead of covering the ground in one year with a good turf, i have seen it filled with weeds not natural to it, and which never would have sprung up, if they had not been brought there.

Arguments are never wanting in support of ancient customs; and i am no stranger to the arguments, such as they are, which prejudice and indolence have made use of on this occasion.

1. Some say then, that if you manure your ground properly; good grasses will come of themselves. I own they will. But the question is how long it will be before that happens, and why be at the expence of sowing what you must afterwards try to kill by manuring? which must be the case, as long as people sow all kinds of rubbish under the name of hay seeds. Again, if the best way is to let the ground take its chance, why is the farmer at the expence of procuring the seeds of the white, and broad clover, which come up in almost all parts of Englan spontaneously? but if this is allowed not to be the best way in relation to clover of any kind, what reason can be in nature, why grass seeds only ought not to be sown pure?

2. Others

slowly method of proceeding, as one would think could not possibly prevail universally; yet this is the case as to all grasses except the darnel grass, and what is known in some few counties by the name of the Suffolk grass; and this latter instance is owing, I believe, more to the soil than any care of the husbandman. Now would the farmer be at the pains of separating once in his life half a pint, or a pint of the different kinds of grass seedsⁿ, and take care

2. Others say, that it is better to have a mixture of different seeds. I will suppose this to be true. But cannot a mixture be had though the seeds be gathered, and separated? and is not a mixture by choice more likely to be proper, than one by chance? especially after a sufficient experience has been had of the particular virtues of each sort, the different kinds of cattle each grass is most adapted to, the different grounds where they will thrive best, &c. all which circumstances are now in general wholly unknown, though of the utmost consequence.

3. It is said by some, that weeds will come up along with the grass. No doubt of it. Can any one imagine that grass seeds should be exempted above from what happens to every other kind of seed. But I will venture to say, that not near the quantity of weeds will spring up which they imagine, if it be sown very thick. Men must be very much put to it, when they make such objections as this last, or indeed any of the others. I am almost inclined to say with a great writer, ‘It is a simple thing to take much pains to answer simple objections.’

ⁿ I have had frequent experience how easy it is to gather the seeds of grasses, having employed children of ten or eleven years old

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care to sow them separately; in a very little time he would have wherewithal to stock his farm properly, according to the nature of each soil, and might at the same time spread these feeds separately over the nation by supplying

old several times, who have gathered many sorts for me without making any mistakes, after i had once shewn them the sorts i wanted.

I have procured thus the creeping bent, the fine bent, the sheep's fescue, the crested dog-tail, &c. in sufficient quantities to begin a stock, but for want of a proper opportunity of cultivating them myself, or meeting with any one who had zeal enough to bestow a proper care on them, my collections of this kind hitherto have only proved that the scheme is in itself feasible.

This very year 1761, a little boy by my direction gathered as much of the crested dog-tail in 3 hours by the side of a road, as when shed, yielded upon weighing above a quarter of a pound averdupois, perfectly free from husks. As this seed is small the skillfull will easily judge how far such a quantity would go if properly employed.

My very estimable and ingenious friend Mr. Aldworth, who was witness of the fact which i last mentioned, at my desire ordered a small part of a meadow, near his seat at Stanlake, which had better grasses and less mixed than the rest, to be left unmowed till the seeds were fit for gathering. This piece yielded upon threshing and sifting a full bushel by measure of almost pure seed of the crested dog-tail. In case any one should be inclined to follow this example, i think it highly necessary to observe that care must be taken to mow the grass before it sheds; that it be mowed very early in the morning before the dew is off the ground, and that it ought not be spread as in making hay, but left as it falls from the scythe a sufficient time, and then gently turned over.

the

the feed-shops. The number of grasses fit for the farmer is, i believe, small ; perhaps half a dozen, or half a score are all he need to cultivate ; and how small the trouble would be of such a task, and how great the benefit, must be obvious to every one at first sight. Would not any one be looked on as wild who should sow *wheat, barley, oats, rye, peas, beans, vetches, buck-wheat, turneps* and weeds of all sorts together ? yet how is it much less absurd to do what is equivalent in relation to grasses ? does it not import the farmer to have good hay and grass in plenty ? and will cattle thrive equally on all sorts of food ? we know the contrary. Horses will scarcely eat hay, that will do well enough for oxen and cows. Sheep are particularly fond of one sort of grass, and fatten upon it faster, than on any other in Sweden, if we may give credit to Linnæus. And may they not do the same in England ? How shall we know till we have tryed ? Nor can we say that what is valuable in Sweden may be inferior to many other grasses in England ; since it appears by the *Flora Suecica* that they have all the good ones that we have. But however this may be i should rather choose to make experiments, than conjectures.

I now propose to add a few observations on some of our grasses, as far as i have been able to make any with some appearance of probability ; but as there has reigned hitherto the greatest confusion in the English names of these most valuable plants, and as they have never been properly ranged but by Linnæus, i shall first, in imitation of that great author in his *Flora Suecica*, give new generical names with trivial ones to distinguish the species of all our English grasses ⁱ. I mean all those which are found in that author ; as for the rest, since some are omitted by him, their names may be easily supplied when their genera are settled by the learned ^k. It happens very luckily, that our common people know scarce any of the grasses by names, as far as i could ever find by conversing with farmers, husbandmen, &c. so that something may be done to remove this confusion, if a list of names be settled and agreed

ⁱ Mr. Hudson having thought proper to adopt my names with some alterations ; and having cleared up many of the species of grasses in a better manner than has been done before ; i have referred throughout to his *Flora Britannica*, which is likely to be in the hands of all who are curious in botany.

^k This has since been done in some measure in the aforementioned *Flora Britannica*.

on by such as are likely to have influence sufficient in these matters. As to my own list, it is only meant as a hint for others to work upon.

In giving names i have had two things in view. First to retain as much as possible such as have hitherto been used for some species of the genus. Secondly, where that could not be done, to give such as are of easy and familiar pronunciation to our common people, and at the same time approach as near as possible to the Latin names in sound where they could not be interpreted. This was done for the sake of the learned for the more easy recollecting the botanical name. Thus i have called the *aira bair*-grafs, the *bromus brome*-grafs, &c. in others i have merely translated the Latin name, as *alopecurus fox-tail* grafs, *cynosurus dog-tail* grafs, &c.

After these preliminary observations i hope it will not be necessary to make any apology for the liberty i have taken. I am certain that till names properly adapted to the purpose be-invented, we have little chance of seeing any general reformation made in this part of husbandry; and even after this without some person properly qualified to direct the countrey people, and shew them the grasses with their names,

nothing will come of that most useful doctrine delivered in the foregoing treatise of Hasselgren¹. But it is to be hoped that gentlemen at least will not be so incurious as to remain ignorant of what imports them so much to know. Nor is the mere botanist less concerned in the success of this scheme, for there is great reason to think that many of the grasses are not thoroughly settled, varieties perhaps being put for different species^m; now this uncertainty can never be better cleared up than by sowing the same kind of seeds on different soils.

¹ Many people having expressed a desire that i should have plates of some of the profitable grasses added to this piece, that most excellent man, the late Mr. Price of Foxley, whose extraordinary character i shall always revere, and do intend to give a sketch of on some future occasion, kindly condescended to employ his pencil, which in the opinion of the best judges was equal to things of a much superior nature, in making me several drawings from the plants themselves, and a very able hand has supplied the rest and engraved them all.

^m Thus Gmelin Flor. Lapp. mentions four of the meadow grasses which he says have for a long time perplexed botanists of great reputation. And the editor of Ray's Synopsis, p. 402, doubts whether five grasses which are put down as different by Petiver be not only varieties of a grass mentioned before. I have many specimens of this grass in my collection differing in color, stature and outward aspect, which yet most likely are of the same species.

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A Table of English GRASSES.

GENUS 1.

VERNAL grass, *Tab. 1.* Anthoxanthum *Odoratum* *H. 10. R. 398.1.

GENUS 2.

MAT grass Nardus *Stricta*
H. 20. R. 393.2.

GENUS 3.

Manured CANARY grass Phalaris *Canariensis*
H. 20. R. 394.

Sea CANARY Phalaris *Arenaria*
H. 21. R. 398.4.

Reed CANARY Phalaris *Arundinacea*
H. 21. R. 400.1.

Ribband CANARY Phalaris *ibid. b. ibid.*

GENUS 4.

Green PANIC grass Panicum *Viride*
H. 21. R. 393.1.

Loose PANIC Panicum *Crusgalli*
H. 22. R. 394.2.

Cock's-foot PANIC Panicum *Sanguinale*
H. 22. R. 399.2.

Creeping PANIC Panicum *Dactylon*
H. 22. R. 399.1.

*N. B. H refers to the Flora Britannica of Mr. Hudson.

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G E N U S 5.

- Meadow* CAT's-TAIL *grafs* *Phleum Pratenfe* H. 22. R. 398.1.
Branched CAT's-TAIL *Phleum Paniculatum*
H. 23.
Bulbous CAT's-TAIL *Phleum Nodosum*
H. 23. R. 398.3

G E N U S 6.

- Meadow* FOX-TAIL *grafs*, *Tab. 2.* *Alopecurus Pratenfis* H. 23. R. 396.1.
Field FOX-TAIL *Alopecurus Myosuroides*
H. 23. R. 397.
Bulbous FOX-TAIL *Alopecurus Bulbosus*
H. 24. R. 397.3.
Flote FOX-TAIL *Alopecurus Geniculatus*
H. 24. R. 396.2.

G E N U S 7.

- FEATHER *grafs* *Stipa Pennata*
H. 24. R. 393.3.

G E N U S 8.

- Smooth* COCK's-FOOT *grafs* *Dactylis Cynosuroides* H. 25. R. 393.4.
Rough COCK's-FOOT *Dactylis Glomeratus*
H. 25. R. 400.2.

G E N U S 9.

- MILLET *grafs* *Milium Effusum*
H. 25. R. 402. 1.

G E-

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G E N U S 10.

<i>Silky</i>	BENT	grafs	<i>Agrostis Spica venti</i>
	H. 26. R.	405.17.	
<i>Brown</i>	BENT		<i>Agrostis Canina</i>
	H. 26.		
<i>Red</i>	BENT		<i>Agrostis Rubra</i>
	H. 26. R.	394.4.	
<i>Creeping</i>	BENT		<i>Agrostis Stolonifera</i>
	H. 27. R.	402. 2.	
<i>Marsh</i>	BENT		<i>Agrostis Palustris</i>
	H. 27. R.	404.11.	
<i>Fine</i>	BENT	Tab. 3.	<i>Agrostis Capillaris</i>
	H. 27. R.	402.4.	
<i>Wood</i>	BENT		<i>Agrostis Sylvatica</i>
	H. 28. R.	404.13.	
<i>Small</i>	BENT		<i>Agrostis Minima</i>
	H. 28. R.	appendix.	

G E N U S 11.

<i>Crested</i>	HAIR	grafs	<i>Aira Cristata</i>
	H. 28. R.	396.3.	
<i>Purple</i>	HAIR		<i>Aira Cœrulea</i>
	H. 29. R.	404.8.	
<i>Water</i>	HAIR		<i>Aira Aquatica</i>
	H. 29. R.	402.3.	
<i>Turfy</i>	HAIR		<i>Aira Cespitosa</i>
	H. 29. R.	403.5.	
	B b 4		<i>Mountain</i>

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Mountain HAIR *Tab. 4.* *Aira Flexuosa*
H. 30. R. 407.8,9.

Small-leaved HAIR *Aira Setacea*
H. 30.

Grey HAIR *Aira Canescens*
H. 30. R. 405.16.

Early HAIR *Aira Præcox*
H. 31. R. 407.10.

Silver HAIR *Tab. 5.* *Aira Caryophillea*
H. 31. R. 407.7.

G E N U S 12.

MELIC grasses *Melica Nutans*
H. 31. R. 403.6.

G E N U S 13.

Middle QUAKING grasses *Briza Media*
H. 32. R. 412.1.

Small QUAKING *Briza Minor*
H. 32. R. 412.2.

G E N U S 14.

Water MEADOW grasses *Poa Aquatica*
H. 32. R. 411.13.

Common MEADOW *Poa Trivialis*
H. 33. R. 409.2.

Great MEADOW *Tab. 6.* *Poa Pratensis*
H. 33. R. 409.3.

Creeping MEADOW *Poa Compressa*
H. 33. R. 409.5.

Narrow-

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Narrow-leaved MEADOW *Poa Angustifolia*

H. 34. R. 409. 4.

Bulbous MEADOW *Poa Bulbosa*

H. 34. R. 411. 12.

Hair-leaved MEADOW *Poa Setacea*

H. 34.

Annual MEADOW *Tab. 7. Poa Annua*

H. 34. R. 408 1.

Wood MEADOW *Poa Nemoralis*

H. 34.

Sea MEADOW *Poa Maritima*

H. 35. R. 410. 7.

Hard MEADOW *Poa Rigida*

H. 35. R. 410. 8.

Spiked MEADOW *Poa Loliacea*

H. 35. R. 395. 4.

G E N U S 15.

Sheep's FESCUE grafs, *Tab. 8. Festuca Ovina*

H. 36. R. 410. 9.

FESCUE *Festuca Vivipara*

ibid. b.

Hard FESCUE *Festuca Duriuscula*

H. 36. R. 413. 4.

Purple FESCUE *Tab. 9. Festuca Rubra*

H. 36.

Barren FESCUE *Festuca Bromoides*

H. 37. R. 415. 13.

Wall

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Wall FESCUE *Festuca Myurus*
H. 37. R. 411.16.

Tall FESCUE *Festuca Elation*
H. 37. R. 411.15.

Small FESCUE *Festuca Decumbens*
H. 38. R. 408. 11.

Flote FESCUE *Tab. 10. Festuca Fluitans*
H. 38. R. 412.17.

Spiked FESCUE *Festuca Loliacea*
H. 38.

Wood FESCUE *Festuca Sylvatica*
H. 38. R. 394.

G E N U S 16.

Field BROME *grafs Bromus Secalinus*
H. 39. R. 413.5. 414.7,8.

Corn BROME *Bromus Arvensis*
H. 39. R. 414.9.

Upright BROME *Bromus Erectus*
H. 39.

Wall BROME *Bromus Ciliatus*
H. 40. R. 413.2.

Barren BROME *Bromus Sterilis*
H. 40. R. 412.1.

Tall BROME *Bromus Giganteus*
H. 40. R. 415.11.

Wood BROME *Bromus Ramosus*
H. 40. R. 415.10.

Spiked

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Spiked BROME *Bromus Pinnatus*

H. 41. R. 392.

G E N U S 17.

Naked OAT *grafs* *Avena Nuda*

H. 41. R. 389. *b*:

Bearded OAT *Avena Fatua*

H. 41. R. 389.7.

Meadow OAT *Avena Pratensis*

H. 42. R. 405.1.

Rough OAT *Avena Pubescens*

H. 42. R. 406.2.

Tall OAT *Avena Elatior*

H. 42. R. 406.4.

Yellow OAT *Avena Flavescens*

H. 42. R. 407.5.

G E N U S 18.

Common REED *grafs* *Arundo Pbragmites*

H. 43. R. 401.1.

Branched REED *Arundo Calamagrostis*

H. 43. R. 401.2.

Small REED *Arundo Epigeios*

H. 43. R. 401.3.

Sea REED *Arundo Arenaria*

H. 43. R. 393.1.

G E N U S 19.

Perennial DARNEL *grafs* *Lolium Perenne*

H. 44. R. 395.2.

Annual

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<i>Annual</i>	DARNEL	<i>Lolium Temulentum</i>
	H. 44. R. 395.1.	
	G E N U S	20.
	LYME grafs	<i>Elymus Arenarius</i>
	H. 44. R. 390.3.	
	G E N U S	21.
<i>Common</i>	WHEAT grafs	<i>Triticum Repens</i>
	H. 45. R. 390.1.	
<i>Bearded</i>	WHEAT	<i>Triticum Caninum</i>
	H. 45. R. 390.2,	
<i>Sea</i>	WHEAT	<i>Triticum Junceum</i>
	H. 45. R. 391.5.	
	G E N U S	22.
	BARLEY grafs	<i>Hordeum Murinum</i>
	H. 46. R. 392.3.	
	G E N U S	23.
	RYE grafs	<i>Secale Villosum</i>
	H. 46. R. 392.4.	
	G E N U S	24.
<i>Crested</i>	DOG's-TAIL, grafs	<i>Tab. 11. Cynosurus</i>
	<i>Cristatus</i> H. 47. R. 398.2. 399.3.	
<i>Rough</i>	DOG's-TAIL	<i>Cynosurus Echinatus</i>
	H. 47. R. 397.5.	
<i>Blue</i>	DOG's-TAIL	<i>Cynosurus Cæruleus</i>
	H. 47. R. 399.4.	
<i>Bearded</i>	DOG's-TAIL	<i>Cynosurus Paniceus</i>
	H. 47. R. 396.4.	

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G E N U S 25.

SOFT grafs Holcus *Lanatus*

H. R. 404. 14.

Genus the first. VERNAL. *Tab. 1.*

This grafs grows very commonly on dry hills, and likewise on found rich meadow land. It is one of the earliest grasses we have, and from its being found on such kinds of pastures as sheep are fond of, and from whence excellent mutton comes, it is most likely to be a good grafs for sheep pastures. It gives a grateful odor to hay.

ADDITION. *This grafs i have found on all kinds of grounds, from the most sandy and dry to the most stiff and moist, and even in bogs. It is very plentiful in the best meadows about London, viz. towards Hampstead and Hendon. It is very easy to gather, as i have found by experience; as it sheds its seeds upon the least rubbing.*

Genus the sixth. Meadow FOX-TAIL. *Tab. 2.*

This grafs as well as the foregoing is found in great plenty in our best meadows about London, and i believe makes very good hay. Linnæus says that it is a proper grafs to sow on grounds that have been drained.

ADDITION. *I am informed that the best*
hay

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hay which comes to London is from the meadows, where this grass abounds. I saw this spring a meadow not far from Hampstead, which consisted of this grass chiefly with some of the vernal grass and the corn brome grass. This grass is scarce in many parts of England, particularly Herefordshire, Berkshire and Norfolk. It might be gathered at almost any time of the year from hay ricks, as it does not shed its seeds without rubbing, which is the case of but few grasses.

Water FOX-TAIL.

This is also found in the meadows about town, that are found but lye under water in the winter, and perhaps might be proper to sow on such grounds.

Genus the tenth. *Marsh* BENT.

ADDITION. *This grass grows very commonly in moist grounds and ditches in many parts of England, where i have been. I shall say more of it under article Flote FESCUE grass.*

Fine BENT. Tab. 3.

This grass i have always found in great plenty on the best sheep pastures, as on Malvern hills and on all the high grounds in Herefordshire, that are remarkable for good mutton.

ADDITION. *I may add on Bagshot beath] and the best sheep pastures in Berkshire, Oxfordshire and Norfolk.*

Genus the eleventh. *Mountain HAIR. Tab. 4.*

The same may be said of this grass as of the foregoing. It grows in great plenty on Bagshot heath.

Silver HAIR. Tab. 5.

This also is found on the same kind of pasture as the two foregoing.

Genus the fourteenth. *Great and narrow-leaved*

MEADOW. Tab. 6.

These grasses are common in our best meadow grounds, and i believe make good pasture and hay.

ADDITION. *I have found them frequently on banks by the road side, and near ditches, even where they were not to be found in the adjoining meadows, and pastures.*

Annual MEADOW. Tab. 7.

This grass makes the finest of turfs. It grows every where by way sides, and on rich sound commons. It is called in some parts the Suffolk grass. I have seen whole fields of it in High Suffolk without any mixture of other grasses, and as some of the best salt butter we have in London comes from that county, it is most likely to be the best grass for the dairy. I have seen a whole park in Suffolk covered with this grass, but whether it affords good venison i cannot tell, having never tasted of any from it. I should rather think

think not, and that the best pasture for sheep is also the best for deer. However this wants trial. I remarked on Malvern hill something particular in relation to this grass. A walk that was made there for the convenience of the water drinkers, in less than a year was covered in many places with it, tho' i could not find one single plant of it besides in any part of the hill. This was no doubt, owing to the frequent treading, which above all things makes this grass flourish, and therefore it is evident that rolling must be very serviceable to it.

ADDITION. *It has been objected that this grass is not free from bents, by which word is meant the flowering stems. I answer that this is most certainly true, and that there is no grass without them. But the flowers and stems do not grow so soon brown as those of other grasses, and being much shorter they do not cover the radical leaves so much, and therefore this grass affords a more agreeable turf without mowing than any other whatever that i know of.*

Sheeps FESCUE. Tab. 8.

This is the grass so much esteemed in Sweden for sheep.

Gmelin, Flor. Sibir. says that the Tartars choose to fix during the summer in those places where there is the greatest plenty of this grass; because

because it affords a most wholesome nourishment to all kinds of cattle, but chiefly sheep; and he observes that the sepulchral monuments of the antient Tartars are mostly found in places that abound with this grass, which shews, adds he, that it has long been valued amongst them.

I have among my grasses a specimen of it, but do not remember where i found it. I am certain it is not common in any of the places where i have been. Perhaps upon examination it may be found on places famous for our best mutton, as Banstead Downs, Church-Stretton in Shropshire, some parts of Wales &c.

ADDITION. *I have since found this grass in great plenty in many parts of England and Wales; indeed on all the finest sheep pastures in Herefordshire, Berkshire, Oxfordshire, Norfolk &c. The reason why i thought it not common was, that it is an early grass, and had shed its seeds, before i usually made my searches in those places where it only grows. I must also observe that, contrary to what Linnæus says, either the sheep or some other animals do eat the flowering stems of this grass, for upon Banstead Downs there was nothing to be seen but the radical leaves of it, unless amongst the bushes near the hedges, where it was guarded from the sheep.*

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Genus the fifteenth. *Purple FESCUE. Tab. 9.*

ADDITION. *This grass i have always found along with the fine BENT and silver HAIR-GRASS, particularly on Banstead Downs in great plenty in a place inclosed in order to keep the sheep out. From hence i am inclined to think that this is the chief grass all over the Downs, but as the flowering stems in the other parts were intirely gone, unless along the hedges, i could not be certain.*

Flote FESCUE. Tab. 10.

I have no knowledge of the qualities of this grass from my own experience, but shall quote something concerning it out of a piece published in the Amæn. Academ. vol. 3. entitled *Plantæ Esculentæ*. The author says there, artic. 90. that the seeds of this grass are gathered yearly in Poland, and from thence carried into Germany and sometimes into Sweden, and sold under the name of manna feeds. These are much used at the tables of the great on account of their nourishing quality and agreeable taste. It is wonderfull, adds the author, that amongst us these seeds have hitherto been neglected, since they are so easily collected and cleansed.

ADDITION. *Mr. Dean, a very sensible farmer at Ruscomb, Berkshire, assured me that a field always lying under water of about four acres,*
that

that was occupied by his father when he was a boy, was covered with a kind of grass, that maintained five farm-horses in good heart from April to the end of harvest without giving them any other kind of food, and that it yielded more than they could eat. He at my desire brought me some of the grass, which proved to be the flote FESCUE with a mixture of the marsh BENT; whether this last contributes much towards furnishing so good pasture for horses i cannot say. They both throw out roots at the joynts of the stalks, and therefore likely to grow to a great length. In the index of dubious plants at the end of Ray's Synopsis, there is mention made of a grass under the name of *Gramen caninum supinum longissimum*, growing not far from Salisbury 24 feet long. This must by its length be a grass with a creeping stalk; and that there is a grass in Wiltshire growing in watery meadows so valuable, that an acre of it lets from 10 to 12 pounds, i have been informed by several persons. These circumstances incline me to think it must be the flote fescue; but whatever grass it be, it certainly must deserve to be inquired after.

There is a clamminess on the ear of the flote fescue when the seeds are ripe that tastes like honey, as i have often found, and for this reason perhaps they are called manna seeds.

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Linnaeus Flor. Suec. art. 95. says, that the bran of this grass will cure horses troubled with bots, if kept from drinking for some hours.

Genus the seventeenth. *Yellow OAT.*

This grass is found in great plenty in some grounds where the sheep's FESCUE, the fine BENT, and the crested DOG-TAIL grow, and therefore likely to be good for sheep. It is also not uncommon in good meadows.

Genus the nineteenth. *Perennial DARNEL.*

This grass is well known, and cultivated all over England; and it is to be hoped the success we have had with it will in time encourage our farmers to take the same pains about some others that are no less valuable, and are full as easy to be separated. It makes a most excellent turf on sound rich land where it will remain.

If i may judge by the venison i have eat out of a paddock, that was chiefly filled with this grass, i would by no means recommend it for parks. I know it will be said that venison is never good out of a paddock, that the deer must have room to range, trees to browse on, &c. I grant there is some reason for saying this, but i believe in general it is more owing to want of proper food, viz. good grass, than merely to confinement; for paddocks are generally made
by

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by converting some rich spot near the house, that has constantly been manured, and of course is full of grasses fitter for the dairy or the stable than for deer, which hardly ever is the case of large parks. No man will, i suppose, pretend to make good pork from a hog fed with grains instead of peas, tho' he has the liberty of choosing as much ground as he pleases, and where he pleases.

This grass is called in many counties *rye grass*. It were to be wished that the old name might prevail, because there is a genus of grass, viz. the 22d. known by the name of *rye* all over the kingdom, of which genus there is a species that ought to bear the same generical name.

ADDITION. *I have since eaten venison out of a large park, where there was much of this grass, and it was no better than that out of the paddock. I should be apt to think from hence that this grass would not be proper for sheep, as i have always observed that the same kind of ground which yeilds good venison yields also good mutton. For what particular uses it is good, wants to be tryed, whether for the dairy, for fatting cattle, or for horses. Many are tempted by the facility of procuring the seed of this grass to lay down grounds near their houses, where they want to have a fine*
turf

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turf with it ; for which purpose unless the soil be very rich a worse grass cannot be sown, as it will certainly die off in a very few years intirely.

Genus the twenty fourth. Crested DOG-TAIL. *Tab. 11.*

This grass i imagine is proper for parks. I know one where this abounds, that is famous for excellent venison. It may perhaps be as good for sheep.

ADDITION, *That it is good for sheep i have since found by experience. The best mutton i have tasted, next to that which comes from hills where the purple and sheep's fescue, the fine bent, and the silver hair grasses abound, having been from sheep fed with it.*

It makes a very fine turf upon dry sandy or chalky soils, as i have seen in many parts of Berkshire, but unless swept over with the scythe, its flowering stems will look brown ; which is the case of all grasses, which are not fed by variety of animals. For that some animals will eat the flowering stems is evident by commons, where scarcely any parts of grasses appear but the radical leaves.

Order of coming into ear of the above mentioned grasses.

Annual MEADOW

Meadow FOX-TAIL

VERNAL

VERNAL

Great MEADOW

Narrow-leaved MEADOW

Crested DOG-TAIL

Sheep's FESCUE

Purple FESCUE

Fine BENT

Marsh BENT

Silver HAIR

Yellow OAT

Flote FESCUE

The whole time from the beginning of May
till about the middle of June.

Εἰ—κεν καὶ σμικρον ἐπὶ σμικρῷ καλάθειο

Καὶ θαυμά τ' ἐρδ' οἷς, ταχὰ κεν μέγα καὶ το γενεῖο.

Hesiod.

F I N I S.

Tab. 1.



Vernal Grass.

R. Price delin.

Antennaria dioica

Tab. 2.



R. Price delin. Meadow Fox-tail Grass.

Wheeleria Pratincola



R. Price delin. Fine Bent Grass.
Agrostis capillaris



Mountain Hair Grass.

R. Price delin

Aira flexuosa



J. Miller del. et sc.

Silver Hair-Grass.

Aira coryophylla



Tab. 6.



Great Meadow Grass.

R. Price delin.

Poa pratensis

Tab. 7.



Annual Meadow Grass.

P. Miller del. et Scz

Poa Annua



Sheeps Fescue Grass.

R. Price delin.

Festuca ovina



Tab. 10.



Flote Piscue Grass.

J. Miller del. et sc.

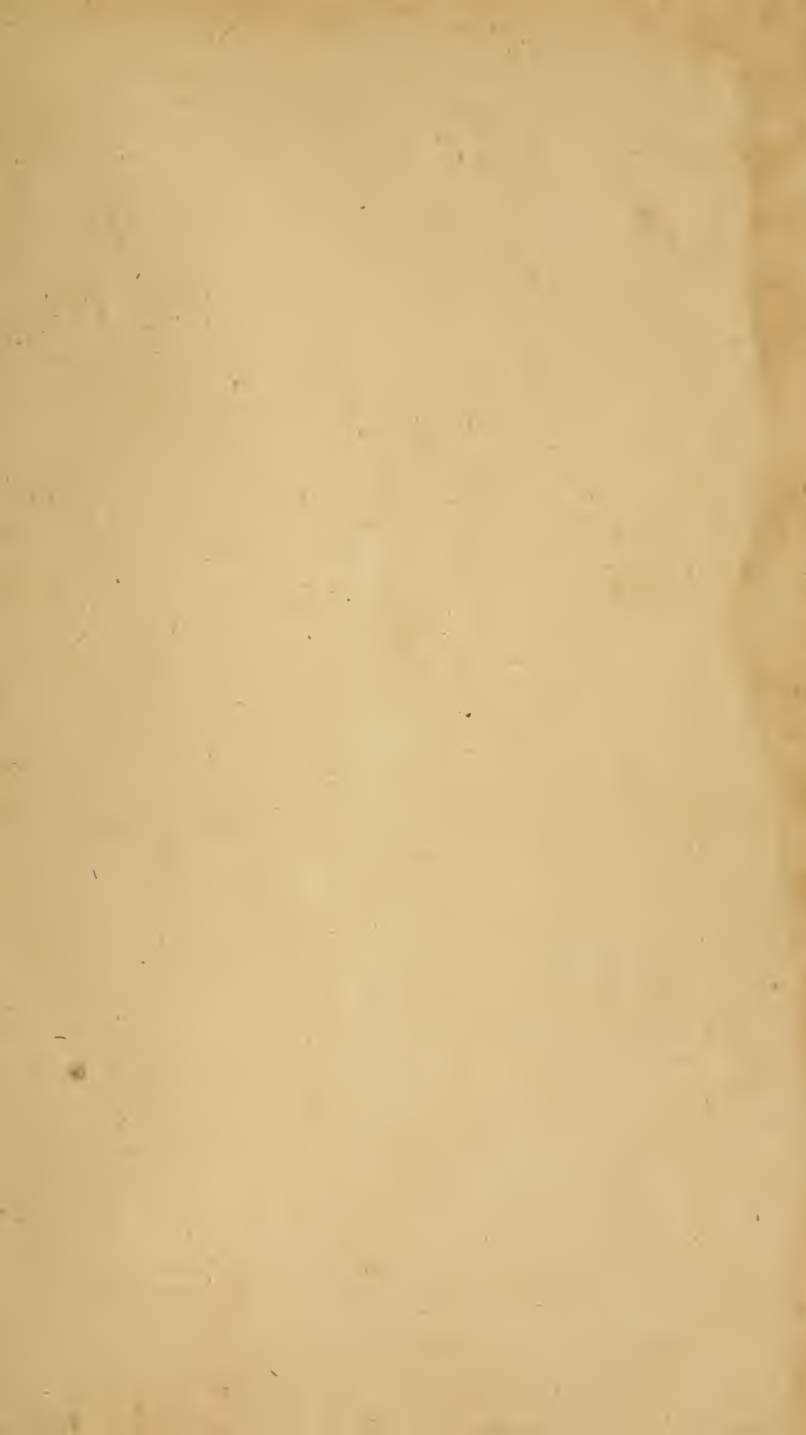
Festuca Phytanæ

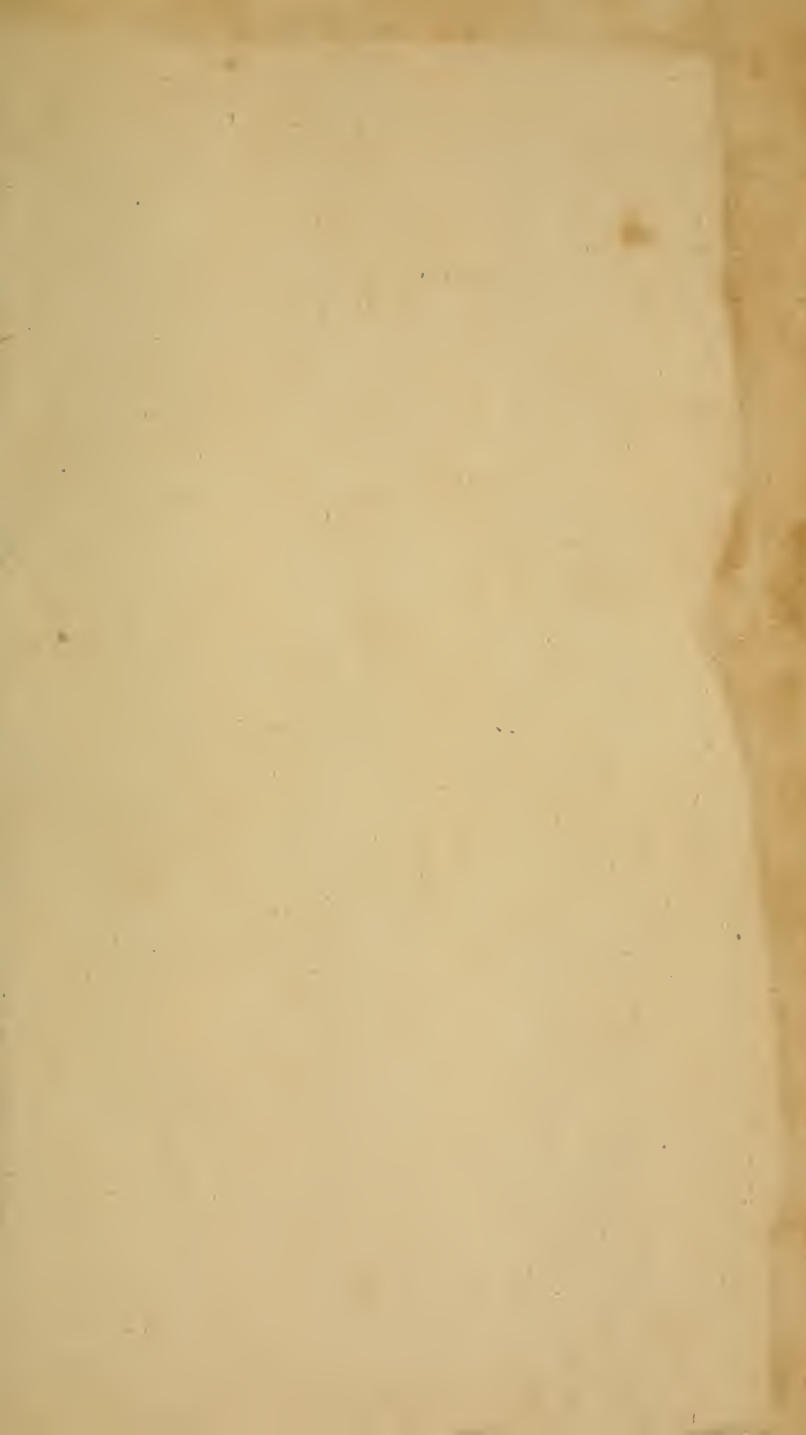


Crested Dog-tail Grass.
R. Price delin.

Cynodorus cristatus









QH9 .S8 1762 gen
Stillington, Benj/Miscellaneous tracts



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